

**The Afrotropical genus
Bogosia Rondani, 1873 (Diptera: Tachinidae)**

by

David Andrew Barraclough¹

(Natal Museum, Pietermaritzburg, South Africa)

ABSTRACT

The genus *Bogosia* Rondani is redescribed. Ten Afrotropical species are recognised. New species: *B. argentea*, *B. curvaverpa*, *B. grahami*, *B. rogezensis*. Redescriptions: *B. antinorii* Rondani, *B. bequaerti* Villeneuve, *B. helva* (Wiedemann), *B. rubens* (Villeneuve), *B. rufiventris* Bigot, *B. inconspicua* (Villeneuve). New synonymy: *B. taeniata* (Wiedemann) and *B. minor* (Villeneuve) are synonymised with *B. helva*. Males and females are keyed separately according to external characters while another key to males, based on the form and structure of the aedeagus, is also presented.

INTRODUCTION

Several species of *Bogosia* Rondani, 1873 are remarkable for the degree of variation in colouring and/or form which they show. In addition, sexual dimorphism in some species is so extreme, that conspecificity of males and females collected from the same locality over the same period, may be difficult to accept. These two features, together with the fact that the parasitic habit of the genus may lead to large variations in size, have resulted in the description of a number of synonyms.

Van Emden (1945) was unable to discover any morphological characters to distinguish the species, and suggested that male genitalia were of limited value. His key to the species fails to be of any real use, since most of the characters used are subject to considerable intraspecific variation. In short, the genus required revision and a new key to species. After examining a number of morphologically distinct groups of male specimens, I discovered that differences in external characters were related to consistent differences in the form and structure of the aedeagus. With external characters commonly being subject to considerable variation, I soon realised that the only way in which stability could be brought to the genus, would be by characterising species primarily on aedeagal characters. Only then could external characters of importance be identified and females associated with males from the same localities. This procedure was, therefore, adopted for this revision.

Wiedemann described the first two species now placed in *Bogosia* Rondani in 1818 and 1824. He clearly attempted to relate these Afrotropical species to the European fauna, since both were assigned to Palaearctic genera. The first species

¹ New address: School of Zoology, University of New South Wales, Sydney, Australia.

was *Phasia helva*, and although superficially similar to *Bogosia*, *Phasia* Latreille has the posterior part of the frons markedly narrowed, the parafrontals hairy and the R_5 cell open; all *Bogosia* species have the frons of almost equal width anteriorly and posteriorly, the parafrontals bare and the R_5 cell closed. The second species, *Phania taeniata*, was described from the same locality as *Phasia helva*. Wiedemann (1830) subsequently placed *Phania taeniata* in *Phasia*.

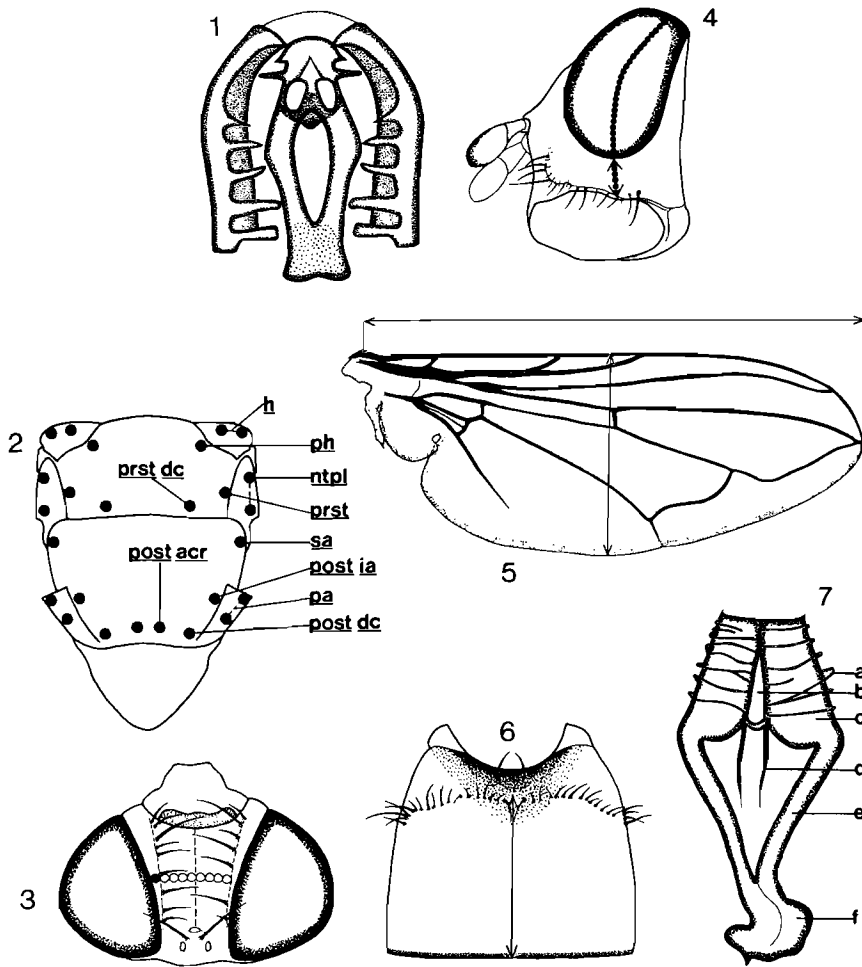
Rondani (1873) erected *Bogosia* for *B. antinorii*, described from Bogos in Ethiopia. Bigot described *B. rufiventris* from South Africa in 1876, and Karsch followed with the description of *B. engeli* from Angola in 1887.

Brauer & Bergenstamm (1891) were apparently unaware of Rondani's paper, or thought that *Phasia helva* and *Phania taeniata* did not relate to his description of *Bogosia*, since both species were allocated to their new genus *Epineura*, described as being distinct from *Phasia* in having the R_5 cell closed. Subsequently, *E. minor* Villeneuve, 1913; *E. rubens* Villeneuve, 1923 and *E. inconspicua* Villeneuve, 1938 were all described. Townsend (1916) designated *Phasia helva* as the type species of *Epineura*. Villeneuve (1926) distinguished *Epineura* from *Bogosia* by stating that *Epineura* species are sexually dimorphic with longer claws in males, whereas *Bogosia* species are not sexually dimorphic with claws not longer in males.

Townsend (1933) erected the new genus *Engelobogosia* for *Bogosia engeli*, but although he gave a detailed description of the new genus, he did not indicate diagnostic characters. However, Townsend (1936) subsequently specified the generic characters of *Engelobogosia*, when he stated that the genus possessed ocellar setae and a third antennal segment almost twice the length of the second, whereas *Bogosia* lacked ocellar setae and possessed a third antennal segment only a little longer than the second. He also (1936) distinguished *Epineura* from the last two genera on the basis of its having two sternopleurals and undeveloped discal setae, with *Engelobogosia* and *Bogosia* having one sternopleural and developed discal setae.

Van Emden (1945) synonymised *Epineura* and *Engelobogosia* with *Bogosia*. *Epineura* cannot be distinguished from the other two genera on the basis of sexual dimorphism and longer claws in males (Villeneuve 1926), since this dimorphism either does not occur or is not always intraspecifically consistent, and all *Bogosia* species have longer claws and pulvilli in males than in females. In addition, *Bogosia* species are subject to variations in setal numbers. Thus conspecifics may have one or two sternopleurals or ocellars present or absent, although as a rule *Bogosia* species possess two sternopleurals and ocellars. These observations also clearly invalidate the distinctiveness of *Bogosia* and *Engelobogosia*.

The Oriental-Australasian genus *Pentatomophaga* de Meijere, 1917 is very similar to *Bogosia*. I have seen four badly damaged males and females from the BMNH, but although I could not find any consistent external characters to distinguish the two genera, I consider the aedeagus of *Pentatomophaga* (Fig. 1) to be generically distinct from that of *Bogosia* (Fig. 7): the distiphallus is barely developed, the spiral crests are absent, and the connections and distiphallic region are enclosed by a sclerotised structure with lobe-like projections or longitudinal ridges along its ventral surface.



Figs 1-7. *Pentatomophaga* de Meijere species, aedeagus, dorsal aspect. 2-7. *Bogusia*. 2. Thorax, dorsal aspect, showing positions of setal insertions. *h* = humerals, *ph* = posthumeral, *ntpl* = notopleurals, *prst* = presutural, *prst dc* = presutural dorso-central, *sa* = supra-alar, *pa* = postalars, *post ia* = postsutural intra-alar, *post dc* = postsutural dorso-central, *post acr* = postsutural acrostichal. *stpl* = sternopleurals (not figured). 3-6. Calculation of ratios for characters of head, wing and abdomen. 3. Head, dorsal aspect, measurement of I.P. ratio: $\circ \times 8$ = interfrontal width, $\bullet$ = parafrontal width. 4. Head, ventrolateral aspect, measurement of E.G. ratio. 5. Wing, measurement of W. ratio. 6. T1+2, dorsal aspect, measurement of T2 ratio. 7. Aedeagus, dorsal aspect. *a* = spiral crest, *b* = mediodorsal groove, *c* = distiphallus, *d* = filament, *e* = connection, *f* = basiphallus.

EXPLANATION OF TERMS

The following terms are used frequently in the descriptions and need explanation:

Testaceous—Yellow-brown ground colouring (not brick-red as interpreted by some authors).

Thoracic collar—Pruinosity of apparent gold, yellow or silver colouring, which usually extends between the mesopleura/notopleura, along the anterior margin of the transverse suture. The collar usually extends to midway between the transverse suture and the anterior margin of the prescutum.

Aedeagal sheath—A brown membrane which may wholly or partly enclose the space between and below the aedeagal connections, usually arching up the lateral margin of each connection and sometimes around the base of the distiphallus.

The terminology used in the descriptions of aedeagi (Fig. 7) is a combination of that used by van Emden (1945), Verbeke (1963), Griffiths (1972) and Rikhter (1982). Other terminology is mostly in accordance with Crosskey (1984).

TECHNIQUES

All species identifications were based on comparison with holotypes and other type material. If a type could not be located, identifications were made by referring to original descriptions, if these were adequate (*B. engeli* Karsch and *B. bequaerti* Villeneuve).

Only dry, pinned specimens were examined. Male genitalia were removed and macerated with care, because of the importance of aedeagal structure. Since the hind margins of the telomeres are very firmly attached to the last sternal segment, and because the aedeagus could project well forward into the abdominal cavity, the hypopygium was not removed in situ, nor was the abdominal apex cut off. The hypopygium was best removed by snapping off the abdomen at its base, clearing the entire structure in hot KOH, and then removing the hypopygium by breaking the telomere-S5 attachment with a pair of fine pins. Aedeagi were placed in a glycerine/glycerine-jelly mixture on depression-slides for illustration. The glycerine-jelly prevented the rotation of the hypopygium when the aedeagus was being drawn in lateral view. After being studied, the aedeagi (still attached to the rest of the hypopygium) and the remaining abdominal segments were stored in microvials filled with glycerine or mounted in Canada balsam on cellulose strips, and pinned beneath the specimens.

EXPLANATION OF USEFUL TAXONOMIC CHARACTERS

Because of considerable intraspecific variation in some *Bogosia* species, many conventional characters used by dipterists are unreliable, and the calculation of certain ratios became important for species discrimination and for giving an indication of the range of intraspecific variation. The second value for all ratios is 1.0 and is omitted.

In each description, in addition to general colouring, only characters which show

a great degree of interspecific variation have been used. Reference should be made to the redescription of the genus for an indication of the variation in other characters, many of which vary intraspecifically.

Head

I. Extent and colouring of dark pruinosity on parafrontals and colouring of pale pruinosity, if present.

II. Colouring of pruinosity on face, facial ridges, parafacials and genae.

III. Interfrontal : Parafrontal width ratio (I.P. ratio). This ratio gives an indication of the varying width of the interfrontal area, relative to the width of the parafrontal area. Measurements were taken when the frons was parallel to the plane of the eye-piece, the position of measurement being midway between the apex of the ocellarium and the base of the lunula (Fig. 3). The interfrontal width was taken as the distance between the outer margins of the two rows of frontal setae, and the parafrontal width as the distance from the outer margin of the frontal row to the edge of the eye.

IV. Eye : Gena height ratio (E.G. ratio). This ratio gives an indication of the varying height of the gena relative to eye height. To measure the maximum eye height, the head was viewed laterally. The gena height was measured by imagining a line running downwards and bisecting the eye in lateral view; the point where the line reaches the lowermost margin of the eye was taken to be the upper margin of the gena. The lower margin of the gena is the point where the continuation of the line reaches the first indication of the peristomal fold, on the edge of the oral cavity. The gena height is the distance between these two points (Fig. 4). It was measured when the gena was positioned parallel to the plane of the eye-piece.

Thorax

I. Development and colouring of thoracic collar.

II. Presence or absence of posthumeral setae.

III. Nature and colouring of scutal pruinosity.

IV. Colouring of scutellum.

V. Nature and colouring of pleural pruinosity.

VI. Colouring and patterning of legs.

VII. Colouring and patterning of wings.

VIII. Wing length : width ratio (W. ratio). This ratio gives an indication of the varying width of the wing, relative to its length. The length measurement was taken from the apex of the tegula to the wing-tip. The maximum wing-width measurement was usually taken through the second costal sector and just behind *r-m* (Fig. 5).

Abdomen

I. Shape, colouring and patterning.

II. Nature of pruinosity, if present.

III. Nature of setae along hind margin of T3, if unusual.

IV. T2 width : length ratio (T2 ratio). This ratio gives an indication of the varying length of T2, relative to its width. The width of T2 was measured along the hind

margin. The length measurement was taken medially, from the T2/3 junction to the anterior margin of the setal row delineating the point of fusion between T1 and T2 (Fig. 6). T1 + 2 is sometimes referred to as the first segment by some authors.

V. Aedeagal form and structure (see Fig. 7). The following characters, together with other less important features are discussed in the descriptions: shape and relative proportions of basiphallus, connections and distiphallus; development of sheath beneath connections and around lateral margins of connections and distiphallus base; presence or absence of filaments; nature and development of spiral crests (simple or denticulate); development and shape of mediodorsal groove; aedeagal length : width ratio (both measurements must be the maximums). Aedeagi are of two kinds, Type A and Type B, as differentiated in the key to species based on aedeagal characters.

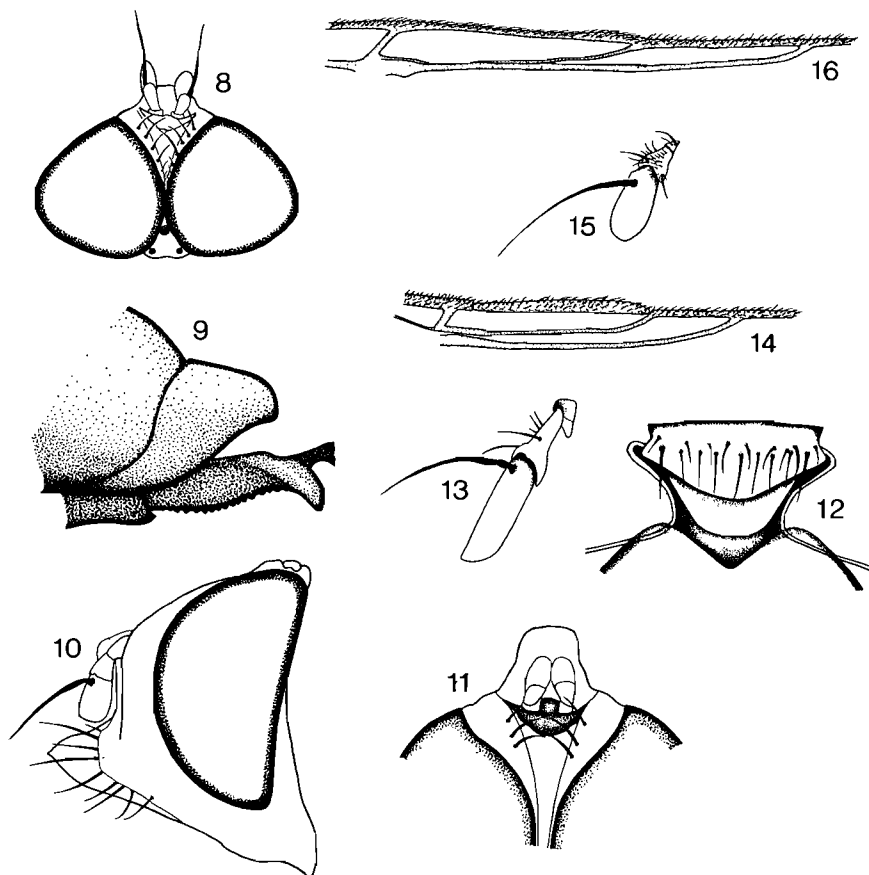
ACKNOWLEDGEMENTS

I am deeply indebted to the following institutions for their assistance in lending me collections and/or types, or for searching unsuccessfully for types and other specimens. Abbreviations are given for those institutions whose material was actually examined.

Albany Museum—Grahamstown, South Africa.
American Museum of Natural History—New York, U.S.A.
British Museum of Natural History (BMNH)—London, United Kingdom.
Durban Museum and Art Gallery (DMAG)—Durban, South Africa.
Institut Royal des Sciences Naturelles de Belgique (IRSNB)—Brussels, Belgium.
Koninklijk Museum voor midden-Afrika (KMMA)—Tervuren, Belgium.
Museo Civico di Storia Naturale (MCSN)—Genoa, Italy.
Museum of Comparative Zoology—Cambridge, U.S.A.
Muséum National D'Histoire Naturelle (MNHN)—Paris, France.
Nasionale Museum—Bloemfontein, South Africa.
Natal Museum (NM)—Pietermaritzburg, South Africa.
National Collection of Insects (NCI)—Pretoria, South Africa.
National Museum of Bulawayo (NMB)—Bulawayo, Zimbabwe.
National Museum of Natural History—Washington, U.S.A.
National Museum of Kenya (NMK)—Nairobi, Kenya.
Naturhistorisches Museum Wien (NMW)—Vienna, Austria.
Naturhistoriska Riksmuseet (NR)—Stockholm, Sweden.
Plant Protection Research Institute (PPRI)—Harare, Zimbabwe.
South African Museum—Cape Town, South Africa.
Staatliche Museum für Naturkunde (SMN)—Stuttgart, West Germany.
State Museum—Windhoek, Namibia.
Zoological Museum—Lund, Sweden.
Zoologische Staatssammlung—Munich, West Germany.
Zoologisches Museum—Berlin, East Germany.
Zoologisk Museum (ZM)—Copenhagen, Denmark.

I should like to acknowledge the financial assistance received in the form of an M. L. Kirsch Postgraduate Scholarship as well as the encouragement of the

Director, Assistant-Director and Council of the Natal Museum. My sincere thanks are due to my supervisors, Professor D. J. Brothers and Dr R. M. Miller, but particularly to Professor Brothers, who gave unstintingly of his time and was of invaluable assistance. I am grateful to the Head of the Department of Entomology at the British Museum, for the prolonged loan of their entire collection of *Bogosia*.



Figs 8–16. 8–12. *Alophora* Robineau-Desvoidy species. 8. Head, dorsal aspect. 9. Ovipositor, lateral aspect. 10. Head, lateral aspect. 11. Sublunular bulla, dorsal aspect. 12. Scutellum and postscutellum, dorsal aspect. 13–14. *Gymnosoma* Meigen (generalised diagrams). 13. Antenna, lateral aspect. 14. Costal margin, showing (from left to right) junction of humeral crossvein, Sc and R_1 . 15–16. *Bogosia* Rondani/*Bogosiella* Villeneuve (generalised diagrams). 15. Antenna, lateral aspect. 16. Costal margin, showing (from left to right) junction of humeral crossvein, Sc and R_1 .

KEY TO THE AFROTROPICAL GENERA OF PHASIINI

Bogosia is one of four Afrotropical genera of the Phasiini, a tribe of the subfamily Phasiinae.

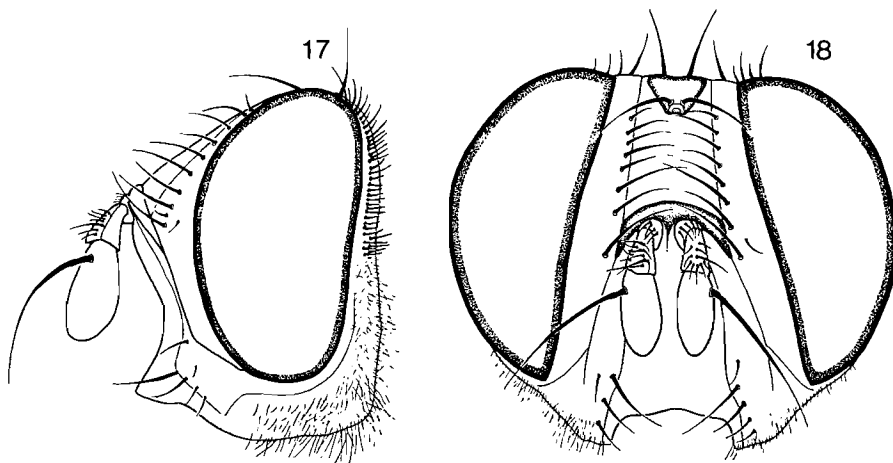
1. Eyes of both sexes strongly approximated or meeting in midline of frons (Fig. 8); ovipositor free and lanceolate (Fig. 9); upper eye facets nearly always

- enlarged. Sometimes with the following characters: epistome very prominently produced, distance between vibrissal axis and epistomal apex more than $2,0 \times$ length of second antennal segment (Fig. 10); thorax, wing-base, femora and abdomen with scale-like setae; sublunular bulla prominent, longer than first antennal segment (Fig. 11); scutellum directed upwards and postscutellum prominently exposed (Fig. 12), scutellum with apparent discal setae; abdomen with metallic sheen **Alophora** Robineau-Desvoidy
- Eyes of male only, sometimes approximated, but never meeting; ovipositor concealed or barely exposed; upper eye facets not enlarged. Never with the other characters 2
2. Abdominal tergites fused; ovipositor exposed; antenna long and narrow (Fig. 13); costal distance between humeral crossvein and Sc more than $2,0 \times$ that between Sc and R_1 (Fig. 14) **Gymnosoma** Meigen
- Abdominal tergites not fused; ovipositor concealed; antenna short and third segment globular to ovoid (Fig. 15); costal distance between humeral crossvein and Sc less than $2,0 \times$ that between Sc and R_1 (Fig. 16) 3
3. 2 *stpl*; R_5 petiole subequal to or shorter than length of *r-m*. **Bogosia** Rondani
- 1 *stpl*; R_5 petiole longer than *r-m* **Bogosiella** Villeneuve

BOGOSIA RONDANI, 1873

Type-species: Bogosia antinorii Rondani, 1873, by monotypy.

Bogosia is here redescribed in relation to other Afrotropical genera of Phasiini. *Head* (Figs 17 & 18): Epistome fairly prominent in profile, distance between vibrissal axis and epistomal apex up to $1,5 \times$ length of second antennal segment. Occiput flat to moderately concave behind. Face and facial ridge evenly concave in profile, depth of curve subequal to length of second antennal segment. Profrons



Figs 17–18. *Bogosia* (generalised diagrams). 17. Head, lateral aspect. 18. Head, frontal aspect.

width, in profile, subequal to combined length of first and second antennal segments. Facial ridge and parafacial subequal in width at and below vibrissal axis, but parafacial wider above. Face up to $1.5 \times$ as wide as combined width of facial ridge and parafacial. Sublunular bulla usually absent, shorter than first antennal segment if present. Third antennal segment elongate-ovoid, about twice length of second segment; arista length subequal to or longer than combined length of antennal segments 1–3. Both sexes with eyes widely separated above, about one-quarter to one-third total head width apart at vertex. Proboscis about two-thirds to three-quarters head height. Vibrissa usually distinct, but sometimes indistinct among shorter and weaker peristomal setae. Frontal setae inclinate, extending along side of interfrontal area from ocellarium to lower lateral margin of lunula. Ocellar setae proclinate and divergent (rarely absent). Postocellars and inner vertical setae normally present; outer verticals shorter and weaker than inner verticals, if present at top of postocular row. Parafrontal, interfrontal, face, facial ridge, parafacial, gena and occiput covered with pruinosity.

Thorax: Prescutum and scutum subequal in area. 1–3 *h*. 0–2 *ph*. 1 *prst*. 2 *ntpl*. 0–2 *prst dc*. 1–2 *post dc*. 1 *sa*. 2 *pa*. 1 *post ia*. 1 *post acr*. 2 pairs marginal scutellar setae, apical pair usually convergent to cruciate. Mesopleuron with strongly developed setae along posterior margin. 2 *stpl* (rarely 1). Pteropleuron with setulae weakly developed to absent. Coxae pruinose; femora slender; claws and pulvilli comparatively longer in male than female. Lower calypter with posterior margin straight or exteriorly concave, width of posterior margin two-thirds to subequal to width of scutellum at scutoscutellar suture. Wing venation as in Fig. 5. Distance along *C* between humeral crossvein and *Sc*, less than $2.0 \times$ that between *Sc* and *R*₁. *R*₅ cell angled just after *M=m-cu* junction; *R*₅ petiole shorter than *r-m*, sometimes absent.

Abdomen: 6 tergites in male, 7 in female. Female genitalia concealed within apical 2 terga. Discal setae absent.

Distribution: *Bogosia* is an Afrotropical endemic, confined mainly to the African mainland, but also known from Madagascar. The genus is extremely wide ranging, occurring from Chad and Eritrea in the north to the Cape Peninsula in the south, and from Madagascar (Kenya on the mainland) in the east to Guinea in the west. *Bogosia* species appear to be confined to forested areas or forest margins, and commonly occur in montane and coastal forest. For this reason, the genus is absent from the arid/low rainfall parts of Africa, such as the south-west, including the northern and north-western Cape Province of South Africa, Namibia and Botswana. Similarly, the genus is likely to be found only sporadically north of 10°N, and can be considered to be an almost entirely Subsaharan group.

Host Records: *Bogosia* species are parasites of Heteropteran adults of the families Alydidae, Pentatomidae and Pyrrhocoridae. Different species may parasitise the same host species, and a single species may parasitise a number of genera in two different host families. Greathead & Bigger (1967) give information on the biology of *B. rubens* (Villeneuve 1923) while the discussions following the redescriptions of *Bogosia* species in this paper, contain specific host records.

KEYS TO SPECIES

Key to male *Bogosia* species based on external characters.

1. Parafrontal wholly dark brown to black pruinose; thoracic collar absent **antinorii** Rondani
- Parafrontal always partly silver, yellow or gold pruinose; thoracic collar present, but pruinosity sometimes restricted to notopleuron 2
2. T2 ratio $\leq 1,9$ 3
- T2 ratio $\geq 2,1$ 4
3. Wing hyaline on basal half; *ph* present **rubens** (Villeneuve)
- Wing brown on basal half; *ph* absent **inconspicua** (Villeneuve)
4. I.P. ratio $> 8,0$ (usually $\geq 8,3$) 5
- I.P. ratio $< 8,0$ 7
5. Face silver; parafrontal silver to pale yellow anteriorly **grahami** sp. n.
- Face gold; parafrontal gold anteriorly 6
6. T2–5 red on lateral margins **rogezensis** sp. n.
- T2–5 yellow, testaceous or brown on lateral margins **helva** (Wiedemann)
7. Facial ridge silver on upper half; thoracic collar faintly silver pruinose between mesopleura; T2 ratio $> 2,9$ (usually $\geq 3,1$) **argentea** sp. n.
- Facial ridge yellow to gold on upper half; thoracic collar silver, yellow or gold, sometimes restricted to notopleuron; T2 ratio $\leq 2,9$ 8
8. *ph* absent 9
- *ph* present 10
9. W. ratio $> 2,4$; wing mostly brown and abdomen pale testaceous **curvaverpa** sp. n.
- W. ratio $< 2,2$; wing mostly hyaline, but apically brown if abdomen pale coloured **helva** (Wiedemann)
10. Abdominal tergites yellow, orange, gold, testaceous, brown or black and abdominal dorsum sometimes with brown to black median vitta **helva** (Wiedemann)/**bequaerti** Villeneuve
- Abdominal tergites testaceous and abdominal dorsum never with median vitta **rufiventris** Bigot

Note: Males of *B. helva* (Wiedemann) and *B. bequaerti* Villeneuve may usually be distinguished using the key based on aedeagal characters. Although *B. rufiventris* Bigot males are not always distinguishable from those of *B. helva* and *B. bequaerti* using the above key, they are reliably identified using the key based on aedeagal characters.

Key to male *Bogosia* species based on aedeagal characters.

This key should be used to verify identifications reached with the previous key.

1. Aedeagus long and narrow ($> 3,5 \times$ as long as maximum dorsal width); filaments absent; connections long and nearly always parallel, sheath absent; spiral crests usually without teeth, but teeth large and spine-like or small and apically rounded if present (Type B) 2

- Aedeagus short and broad ($< 3, 5 \times$ as long as maximum dorsal width); filaments present; connections short and divergent, sheath usually present; spiral crests usually with teeth and at least some teeth apically pointed (Type A) 6
- 2. Distiphallus with prominent spines along some of dorsal margin; spiral crests with apically rounded denticulations **grahami** sp. n.
- Distiphallus without spines; spiral crests without denticulations 3
- 3. Distiphallus divided into 2 halves by mediodorsal groove .. **curvaverpa** sp. n.
- Distiphallus sometimes partly divided into 2 halves by mediodorsal groove 4
- 4. Distiphallus with lateral margins and spiral crests curved above lower dorsomedial section **rogezensis** sp. n.
- Distiphallus with lateral margins and spiral crests mostly level with dorso-medial section 5
- 5. Distiphallus with posteroventral margin visible in dorsal view **inconspicua** (Villeneuve)
- Distiphallus with posteroventral margin concealed by posterodorsal margin .. **antinorii** Rondani
- 6. Connections very short: not obviously paired in lateral view (Fig. 26) **rubens** (Villeneuve)
- Connections obviously paired in lateral view (Fig. 41) 7
- 7. Connection-distiphallus junction with forwardly protruding lobe-like projection on each side, visible in dorsal and lateral views (Figs 59 & 60) **rufiventris** Bigot
- Connection-distiphallus junction without projection 8
- 8. Connection (right) broadly ensheathed, with about half its length concealed (Fig. 46); spiral crests prominently denticulate **argentea** sp. n.
- Connection (right) without sheath or less than half its length concealed, if broadly ensheathed spiral crests not denticulate 9
- 9. Distiphallus hyaline and not bulbous in dorsal and lateral views, connections and/or ensheathing arch upwards on each side to unite and form a mediodorsal prolongation visible within posterior half (Figs 40 & 41) . **helva** (Wiedemann)
- Distiphallus usually somewhat sclerotised and/or bulbous in dorsal and lateral views, connections and/or ensheathing usually not arching upwards to form a mediodorsal prolongation (Figs 50–55) **bequaerti** Villeneuve

Key to the species of *Bogosia* based on females.

- 1. Thoracic collar absent **antinorii** Rondani
- Thoracic collar present, but pruinosity sometimes restricted to notopleuron 2
- 2. Abdominal tergites dark brown to black, T2–3 with all or part of lateral margins testaceous, T4 sometimes with testaceous colouring along anterior half to two-thirds of lateral margins (Figs 56 & 57) **bequaerti** Villeneuve
- Abdominal tergites yellow, testaceous or red (apical 3 segments sometimes brown to black mottled), T2–3 never dark brown to black along midline ... 3
- 3. Wing brown on basal half; abdominal tergites red .. **inconspicua** (Villeneuve)
- Without this combination of characters 4

4. Wing hyaline on basal half; abdominal tergites red or yellow to testaceous, apical 2–3 tergites sometimes partly brown if tergites without any red colouring **rubens** (Villeneuve)
- Wing nearly always almost entirely brown to black; abdominal tergites yellow, testaceous or orange, apical 2–3 tergites black if wing hyaline on basal half 5
5. Thoracic collar faintly silver pruinose; parafrontal silver anteriorly **argentea** sp. n.
- Thoracic collar silver or yellow to gold, pruinosity sometimes restricted to notopleuron; parafrontal yellow to gold, sometimes silver but then thoracic collar yellow to gold 6
6. *ph* absent; wing almost entirely brown; abdominal tergites pale testaceous; associated male with type B aedeagus **curvaverpa** sp. n.
- *ph* present or absent; wing variously patterned; abdominal tergites orange or yellow to testaceous (apical tergites sometimes darkened); associated male with type A aedeagus 7
7. Abdominal tergites with apical segments not darkened, tergites usually matt, T3 without median marginal setae (as Fig. 43) **rufiventris** Bigot
- Abdominal tergites with apical segments darkened, if not then tergites usually glossy and T3 with median marginal setae (Fig. 42) **helva** (Wiedemann)

TAXONOMY

Bogusia antinorii Rondani, 1873 Figs 19–22

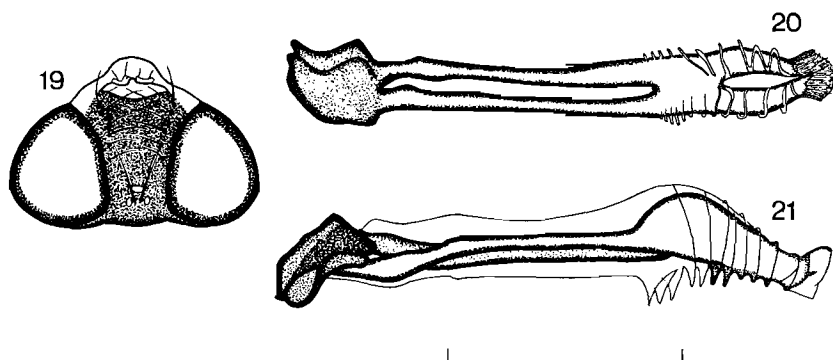
Bogusia antinorii Rondani, 1873: 284 (female holotype; Bogos, Ethiopia); Karsch, 1887: 5; Villeneuve, 1915: 207; Villeneuve, 1918: 508; Villeneuve, 1926: 64; Townsend, 1936: 51; van Emden, 1945: 427–429; Crosskey 1980: 824 [catalogue].

Bogusia engeli Karsch, 1887: 4–5 (female holotype; Pungo-Andongo, Angola); Villeneuve, 1913: 45. *Engelobogusia engeli*; Townsend, 1933: 449–450; Townsend, 1936: 51.

Redescription: Based on all material examined.

Male. Total length (excluding antenna) 6,5–9,0 mm; Wing length 4,5–6,5 mm.

Head (Fig. 19): Parafrontal wholly black pruinose. I.P. ratio 5,5–8,5. Face, facial ridge, parafacial and gena yellow to pale testaceous. E.G. ratio 2,9–3,4.



Figs 19–21. *Bogusia antinorii* Rondani, 1873. 19. Head, dorsal aspect. 20. Aedeagus, dorsal aspect. 21. Aedeagus, lateral aspect. (Scale = 0,5 mm, Figs 20 & 21.).

Thorax: Thoracic collar absent; scutum usually glossy black without pruinosity. Scutellum yellow, but usually darkened along basal margin. *ph* absent (reduced setulae present on a specimen from N. Vumba, Zimbabwe). Pleuron brown to black, but usually white to yellow pruinose on lower half. Coxae, trochanters and basal four-fifths of femora testaceous, but apical fifth of femora black; tibiae usually black, but hind tibia sometimes yellow on medial one-third; tarsi black. Wing brown to black, but anal area and posterior margin sometimes slightly paler. W. ratio 2,5–2,7.

Abdomen: Ovoid. Tergites yellow to testaceous with parts of T5–6 black mottled. T2 ratio 3,0–3,3.

Aedeagus (Figs 20 & 21): Type B. Basiphallus same width as or narrowly broader than connections and distiphallus, but usually distinctly darker. Distiphallus: subequal in width to connections; connections merge with posteroventral margin; dorsal margin rather strongly concavely arched; spiral crests simple and prominently produced below ventral margin; mediodorsal groove bisects apical half, so that each half has a separate series of spiral crests.

Female. As for male, except:

Head: Parafrontal sometimes silver or gold pruinose on outer part of anterior one-sixth. I.P. ratio 4,1–6,3. Parafacial usually silver. E.G. ratio 2,7–3,3.

Thorax: Mesopleuron, sternopleuron, pteropleuron and hypopleuron sometimes partly testaceous coloured. *ph* absent, but reduced setulae present on holotype and a specimen from Ruiru, Kenya. Coxae sometimes partly red.

Abdomen: T4–5 sometimes red to brown mottled. T2 ratio 2,5–3,3.

Notes on female holotype: Parafrontal wholly black pruinose. I.P. ratio 4,6. Parafacial pale testaceous. E.G. ratio 3,0. *ph* absent, but reduced setula present on right side. Hind tibia brown to black. Wing brown, but anal area and posterior margin paler. Abdomen wholly yellow. T2 ratio 3,2. Total length (excluding antenna) 7,5 mm; Wing length 6,0 mm.

Material examined: *Type material*: Holotype ♀: ETHIOPIA: Bogos, 1871, Antinori (MCSN). *Other specimens*: KENYA: 1 ♂, Kijabé, van Someren (BMNH); 1 ♀, Kikuyu escarpment between Kijabé & Limoru on Uganda River, 6 800–7 400 ft, 6–10.iii.1911, S. A. Neave (BMNH); 1 ♂ 1 ♀, Kilimandjaro, 1905–6, Sjöstedt (NR); 1 ♂, Kilimandjaro, Kiboscho, Zone des forets, 1 700 m, 1904, C. H. Alluaud (MNHN); 1 ♂, Nairobi, 1952, L. C. Edwards (BMNH); 1 ♀, Nairobi, 20.vi.1952, D. O. Afrika Exp. (SMN); 1 ♀, Lake Nakuru, 5 767 ft, 15–16.xi.1970, A. E. Stubbs (BMNH); 1 ♂, Nyeri, iii–iv.1948, M. Steele (BMNH); 1 ♀, Rabai, viii.1937, van Someren (BMNH); 3 ♂ 3 ♀, Ruiru C. R. S., viii–ix.1957, Reared from adult *Nezara viridula* (BMNH, NMK). ANGOLA: 1 ♂ 1 ♀, Pungo Andongo, v. Homeyèr (BMNH). MALAWI: 1 ♀, Zomba Plateau, 1535 Ad, Montane forest, 24–27.ix.1980, Stuckenberg & Londt (NM). ZIMBABWE: 1 ♂ 1 ♀, Chirinda forest, xi.1930 & xii.1935 (NMB); 1 ♂, Homestead farm, Borrowdale, Salisbury, 19–27.vi.1976, R. K. Brookes (NMB); 1 ♂, Vumba, 15.vii.1965, D. Cookson (NM); 1 ♂, Vumba, 16.vii.1948, B. D. Barnes (PPRI). SOUTH AFRICA: 1 ♂, Howick, 1903, J. P. Cregoe (BMNH); 1 ♂, Karkloof,

2.ii.1897, G. A. K. Marshall (BMNH); 1 ♀, Katberg, 1–10.ii.1933, R. E. Turner (BMNH); 1 ♀, Pongola-bush Nat. Res., 15 km W. Luneberg, 2730 BC, Forest & surrounding area, 19.ii.1979, J. G. H. Londt (NM); 1 ♀, Silverdale, Nottingham Road, 12.iv.1978, A. C. Butler (NM). MADAGASCAR: 1 ♀, Ambohimombo Forest, 24.i.1895, Dr Forsyth-Major (BMNH).

Discussion: Karsch (1887) described *B. engeli* as a species distinct from *antinorii*, apparently because of its larger size (at 8,5 mm, said to be 1,5 mm longer than *antinorii*), although this difference is negligible in a parasitic genus. Karsch obviously never saw the holotype of *antinorii*, and his description of *engeli* was probably prompted by the fact that the type material was collected in Angola — very far removed from Ethiopia, the type locality of *antinorii*.

The female holotype of *engeli* could not be traced, but the description of *engeli* clearly relates to *antinorii*, with both species sharing the important characters of the frons being wholly black and the thoracic collar absent. Villeneuve (1915, 1918) recognised that *antinorii* is rather widely distributed, and suggested that *engeli* was a synonym. This was confirmed by van Emden (1945).

B. antinorii is the most distinctive species of the genus, being the only one to have the thoracic collar absent. Males and females are similar, with both sexes having the frons always almost entirely black, the scutum glossy black and the scutellum yellow, the wings brown to black and the abdomen yellow to testaceous. Other distinctive external characters are: *ph* absent; E.G. ratio $< 3,4$ (includes the lowest values for the genus); T2 ratio $> 3,0$ in males.

B. antinorii is probably the most widely distributed species, having been recorded from as far north as Eritrea, Ethiopia (16°N) and as far south as the eastern Cape Province of South Africa (32°S). It is the only species to occur on both Madagascar and the mainland, distributed between 15°E and 47°E. It appears to be confined mainly to Africa's east coast (Fig. 22), commonly present in montane and/or forested areas.

B. antinorii has been reared from *Nezara viridula* (Pentatomidae) in Kenya. *N. viridula* is a cosmopolitan green stink bug, which commonly occurs in vegetable gardens, damaging food plants such as tomato. In North America, Mitchell & Mau (1971) have observed that the male sex pheromone of *N. viridula* acts as an attractant or kairomone for *Trichopoda pennipes* (Fabricius). *Trichopoda* is closely related to *Bogosia*, so it is possible that *B. antinorii* is attracted to the male sex pheromone of *N. viridula* in Africa.

Bogosia rubens (Villeneuve, 1923) Figs 23–27 & 30

Epineura rubens Villeneuve, 1923: 78 (male holotype; Ibadan, Nigeria); Villeneuve, 1926: 65; Villeneuve, 1938: 16.

Bogosia minor; van Emden, 1945: 428 & 430 (part); Crosskey, 1980: 824 (part) [catalogue].

Redescription: Based on all material examined.

Male. Total length (excluding antenna) 5,0–12,0 mm; Wing length 3,2–7,5 mm.

Head: Parafrontal wholly silver or gold pruinose, or brown pruinose on posterior one-fifth to four-sevenths. I.P. ratio 3,2–6,0. Face, facial ridge, parafacial and gena gold, but gena sometimes silver on posterior half. E.G. ratio 3,8–4,9.

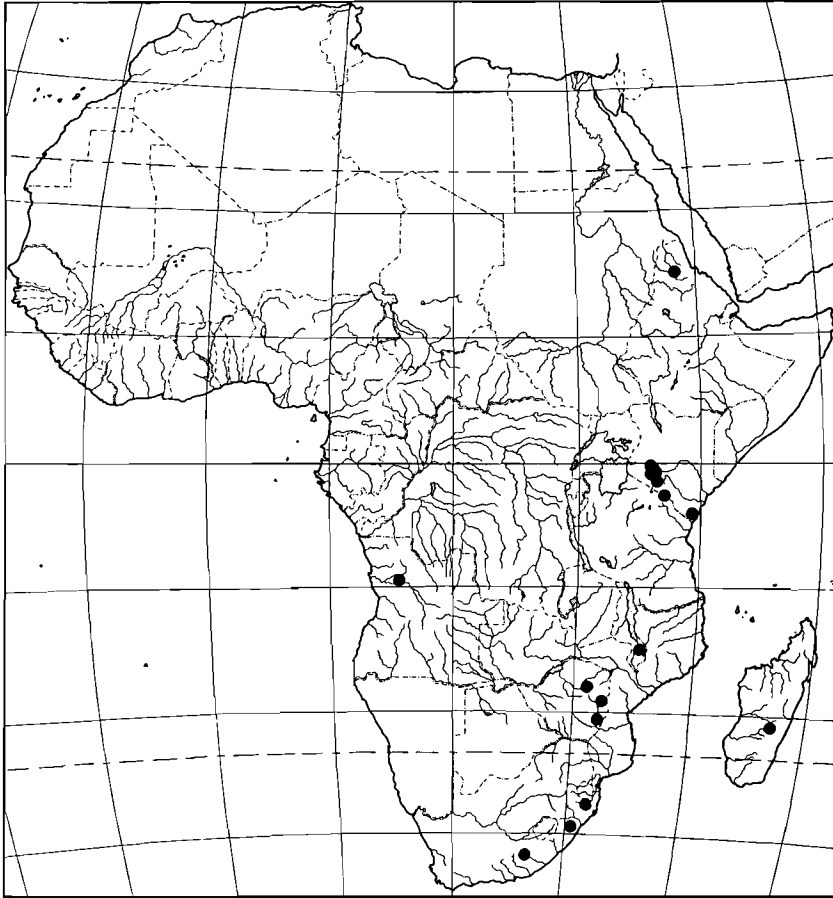
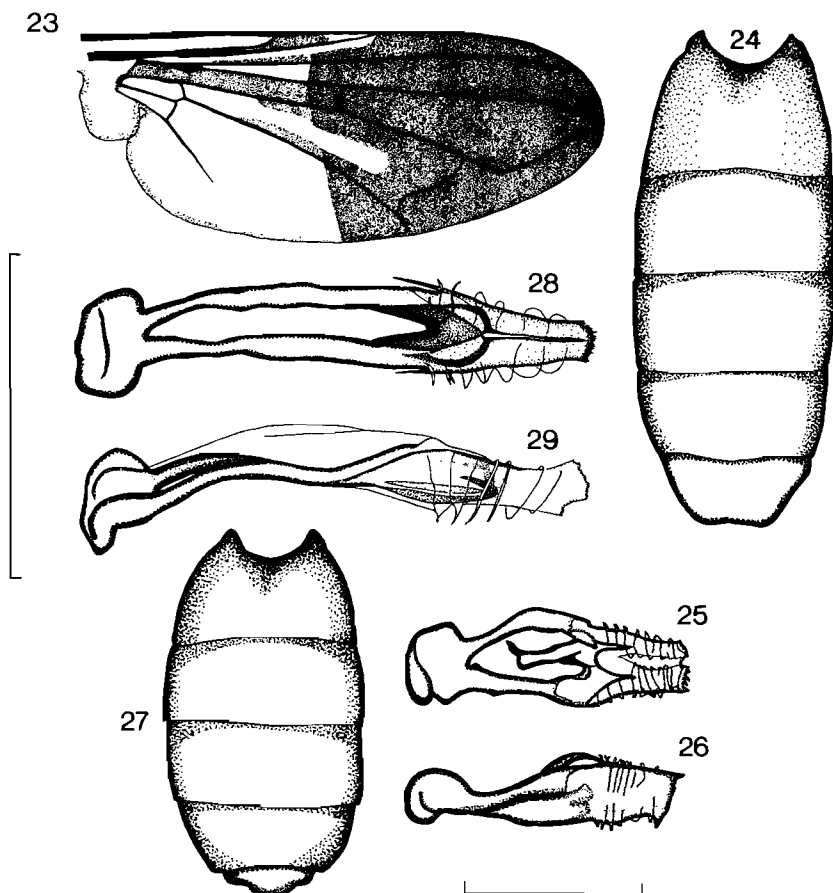


Fig. 22. *Bogosia antinorii* Rondani, distribution.

Thorax (Fig. 23): Thoracic collar present, yellow to gold pruinose, but pruinosity sometimes confined to notopleuron. Scutum irregularly covered with gold pruinosity. Scutellum yellow on apical one-quarter to two-thirds (darkened basally), rarely entirely yellow or brown-black. *ph* present on at least one side. Pleuron silverish to yellow pruinose, sometimes underlaid with yellow colouring. Coxae and trochanters testaceous; fore femora testaceous basally and irregularly brown to black apically, mid and hind femora testaceous basally and brown to black on apical one-quarter to two-thirds; fore and mid tibiae brown to black (mid tibia rarely yellow), hind tibia usually mostly yellow; tarsi black. Wing always entirely hyaline on basal half, apical half usually brown but sometimes hyaline. W. ratio 2,5–3,0.

Abdomen (Fig. 24): Elongate and narrow. Tergites often red, but sometimes partly yellow or red to yellow or yellow to testaceous-brown; apical 3 tergites sometimes brown mottled. T2 ratio 1,4–1,9.



Figs 23-29. 23-27. *Bogosia rubens* (Villeneuve, 1923). 23. Wing. 24. Abdomen, dorsal aspect, ♂. 25. Aedeagus, dorsal aspect. 26. Aedeagus, lateral aspect. 27. Abdomen, dorsal aspect, ♀. (Scale = 0,25 mm, Figs 25 & 26.). 28-29. *Bogosia inconspicua* (Villeneuve, 1938). 28. Aedeagus, dorsal aspect. 29. Aedeagus, lateral aspect. (Scale = 0,5 mm, Figs 28 & 29.).

Aedeagus (Figs 25 & 26): Type A. Basiphallus and distiphallus narrower than connections, which are sometimes arched outwards. Connections very short, subequal in length to distiphallus. Distiphallus: paired filaments present; basal section and apical half of connections sometimes with sheath; connections arch upwards into transparent region, to unite and form an M-shaped cross-connection along posterodorsal margin; spiral crests minutely denticulate; mediodorsal groove along most of length, each side therefore with separate series of spiral crests.

Female. Total length (excluding antenna) 5,5-9,0 mm; Wing length 3,5-5,5 mm. As for male, except:

Head: I.P. ratio 4,4-7,0. Parafacial silver; face, facial ridge and gena sometimes silver. E.G. ratio 4,2-5,5.

Thorax: Pleuron pruinosity sometimes underlaid with black colouring. *ph* apparently absent on a specimen from Hluhluwe, South Africa. W. ratio 2,5–2,8.

Abdomen (Fig. 27): More ovoid than in male. T2 ratio 1,6–2,4.

Notes on male holotype: The holotype is in very poor condition, making it impossible to give measurements or list all the important characters. Parafrontal brown pruinose on posterior one-fifth. E.G. ratio 4,4. Thoracic collar present between mesopleura. Wing hyaline, but brown on apical half. W. ratio 2,6. Abdominal tergites red. T2 ratio 1,8.

Material examined: *Type material*: Holotype ♂, paratype ♀: NIGERIA: Ibadan, 26.x.1922, A. W. J. Pomeroy, Parasite of *Dysdercus supersticiosus* (BMNH). *Other specimens*: NIGERIA: 14 ♂ 18 ♀, Ibadan, ix–xii. 1922/4, bred by A. W. J. Pomeroy ex *Dysdercus supersticiosus* (BMNH); 1 ♀, Ofiki, Oyo State, 7. viii. 1978, P. C. Matteson, From *Mirperus* (BMNH); 1 ♀, Ofiki, Oyo State, 13. viii. 1978, P. C. Matteson, From *Riptortus* (BMNH). UGANDA: 1 ♀ 1 ♂, Kampala, 16.xi.1918, C. C. Gowdey (BMNH); 1 ♀, Kisubi, xi.1972, H. Gönget (ZM); 1 ♂ 1 ♀, Masindi, 29.i.1964 & 9.vii.1964 (BMNH); 1 ♂, Sukula, Tororo dist., 26.i.1962, E. Burt (BMNH). ZAIRE: 1 ♂, Boga, vii.1914, Dr Bequaert (KMMA). TANZANIA: 1 ♂, Chimala, 3.ii.1952 (BMNH); 1 ♂, Kilossa, 1933, Werner (SMN). ZIMBABWE: 4 ♂, Bomponi, Vumba, 16.v.1965 & 24.v.1965, D. M. Cookson (NM). SOUTH AFRICA: 1 ♀, Hluhluwe Res., 2832 Aa, 450 m, 1–5.viii.1977, J. G. H. Londt (NM).

Discussion: Van Emden (1945) synonymised *B. rubens* with *B. minor* (Villeneuve 1913), without giving reasons, but probably because Villeneuve (1923) described his new species *Epineura rubens* by comparison with *Epineura minor*, stating that the two species had a similar size range. However he must have been referring to misidentified specimens, because the characters given for *minor* in his 1945 species key are not those of the *minor* type series. The holotype and paratypes of *minor* have the wings entirely brown, whereas van Emden's key describes *minor* as having the wings hyaline on the basal half.

B. rubens is distinct from *minor*, and the characters van Emden gave for *minor* in his species key are those of *rubens*. *B. rubens* can be distinguished from all other species in having the wings hyaline on the basal half and the T2 ratio < 2,0 in males. It is one of two species, the other being *B. inconspicua* (Villeneuve 1938), to have the abdominal tergites commonly red, but unlike *inconspicua* has a type A aedeagus and *ph* present.

The sexes of *rubens* are similar, with both males and females being subject to variation in wing patterning and abdominal colouring. Thus polymorphism affects both sexes equally.

The distribution of the species is puzzling. It seems to occur mostly along Africa's east coast, between Uganda in the north and Natal (South Africa) in the south (Fig. 30). However, it has also been collected from two separate localities in south-western Nigeria. Despite the fact that extensive collections of *Bogusia* have been made in equatorial areas between Uganda and Nigeria (Zaire, Congo, Gabon and Cameroon), no *rubens* have been collected in this region.

B. rubens has been reared from *Mirperus* and *Riptortus* (Alydidae) in Nigeria,

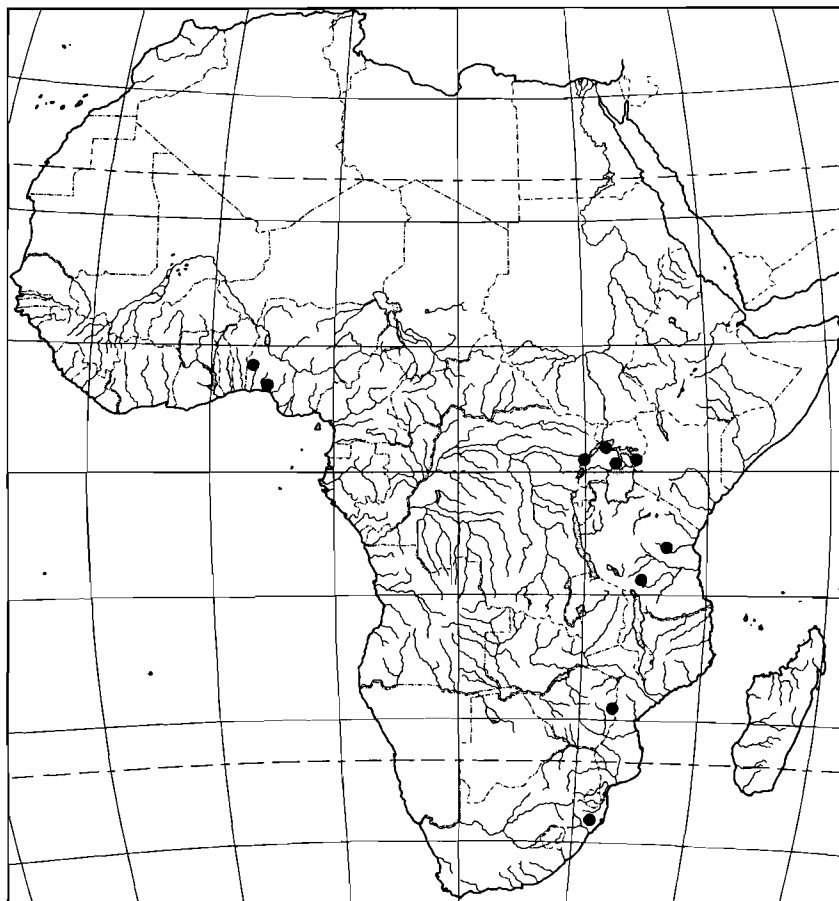


Fig. 30. *Bogosia rubens* (Villeneuve), distribution.

Dysdercus supersticiosus (Pyrrhocoridae) in Nigeria, and according to Greathead & Bigger (1967) from *Antestiopsis orbitalis* (Pentatomidae) in Tanzania. Various *Dysdercus* species are pests of cotton and *Antestiopsis* species are serious pests of arabica coffee in many parts of Africa. Greathead & Bigger (1967) discuss the use of *rubens* in the biological control of *A. orbitalis*.

Bogosia inconspicua (Villeneuve, 1938) Figs 28–29

Epineura inconspicua Villeneuve, 1938: 16 (male/female syntypes; Rutshuru, Zaïre).
Bogosia taeniata; van Emden, 1945: 428–430 (part); Crosskey, 1980: 825 (part) [catalogue].

Villeneuve (1938) did not designate a holotype, but studied two specimens which are labelled as 'types'. Both specimens are valid syntypes and I hereby designate the male lectotype and the female paralectotype (both from Rutshuru, Zaïre).

Redescription: Based on all material examined.

Male. Total length (excluding antenna) 7,5–9,0 mm; Wing length 5,0–5,5 mm.

Head: Parafrontal gold pruinose anteriorly, testaceous to brown pruinose on posterior half to two-thirds. I.P. ratio 4,7–7,3. Face, facial ridge, parafacial and gena mostly gold. E.G. ratio 4,2–4,3.

Thorax: Thoracic collar present, gold pruinose, but pruinosity sometimes indistinct or confined to notopleuron. Scutum dark brown, pruinosity absent. Scutellum dark brown, but sometimes yellow apically. *ph* absent. Pleuron silver pruinose, but underlaid with testaceous to brown colouring. Coxae, trochanters and most of femora testaceous, but apical one-sixth to half of femora brown; tibiae and tarsi brown. Wing entirely brown. W. ratio 2,4.

Abdomen: Elongate and narrow. Tergites bright red. T2 ratio 1,8–1,9.

Aedeagus (Figs 28 & 29): Type B. Basiphallus broader than connections and distiphallus. Distiphallus: subequal in width to connections; narrowly lanceolate protrusion from each posterolateral margin; connections with apicodorsal margins meeting above, in about posterior one-third; connections with inner margins expanded apicoventrally, meeting along posteroventral margin; transparent dorsally and in apical half; dorsal margin slightly arched; spiral crests simple, not as prominently produced below ventral margin as in *antinorii*; mediodorsal groove very narrow, extending from junction of connections above to extreme apex.

Female. Total length (excluding antenna) 6,0 mm; Wing length 4,5 mm. As for male, except:

Head: I.P. ratio 5,6. E.G. ratio 4,6.

Abdomen: Elongate-ovoid.

Notes on male lectotype: Parafrontal testaceous to brown on posterior half to two-thirds. I.P. ratio 4,7. E.G. ratio 4,2. T2 ratio 1,9. Total length (excluding antenna) 7,5 mm; Wing length 5,0 mm.

Material examined: *Type material*: Lectotype ♂, paralectotype ♀: ZAÏRE: Rutshuru, iii. 1938, J. Ghesquière, Parasite des *Antestia* adultes (IRSNB). *Other specimen*: ZAÏRE: 1 ♂, same data but 7. iv. 1938 (IRSNB).

Discussion: Van Emden (1945) synonymised *B. inconspicua* with *B. taeniata* (Wiedemann, 1824), *B. rufiventris* Bigot, 1876 and *B. similis* Villeneuve, 1926, although no reasons were given. *B. inconspicua* is, however, distinguished from all other species in having the T2 ratio < 2,0, the abdominal tergites red and the aedeagus of type B. *B. inconspicua* is superficially similar to *rubens*, but is distinguished in having *ph* absent, scutal pruinosity absent and the wings entirely brown. The sexes of *inconspicua* are similar.

B. inconspicua is known only from the eastern border of Zaïre. It has been reared from *Antestia* (Pentatomidae), which is an important pest of coffee in East Africa (Miller 1971).

***Bogosia grahami* sp. n. Figs 31–32**

Derivation: Named after Dr W. M. Graham, in recognition of his fine collection of *Bogosia* from Ghana.

Description: Based on ♂ holotype, but supplemented with information from ♂ paratype (in parentheses).

Male. Total length (excluding antenna) 6,3 (6,5) mm; Wing length 3,5 (4,0) mm.

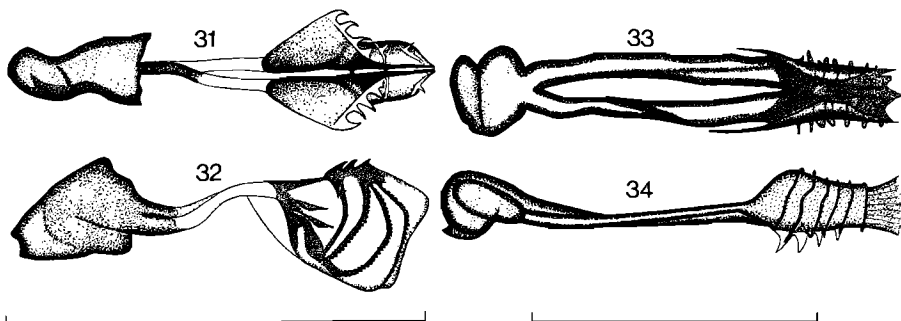
Head: Parafrontal silver to pale yellow pruinose anteriorly, dark brown to black pruinose on posterior four- to five-sevenths. I.P. ratio 13,5 (11,6). Face, facial ridge and gena silver; parafacial mostly silver, but pale yellow at upper end. E.G. ratio 4,4 (4,3).

Thorax: Thoracic collar present, silver to pale yellow pruinose. Scutum dark brown to black with pale brown pruinosity on posterior half. Scutellum dark brown to black. *ph* present. Pleuron mostly silver pruinose, but pteropleuron with brown pruinosity. Coxae testaceous to brown; trochanters, femora, tibiae and tarsi dark brown to black. Wing entirely brown. W. ratio 2,2 (2,4).

Abdomen: Fairly elongate. Tergites testaceous, but T1, lateral margins of T2, lateral margins on posterior half of T4, and entire T5–6 brown; median brown vitta on T2–4 (testaceous on lateral margins of T2 and T4; brown on posterior half of T5, with median brown vitta on anterior half). T2 ratio 2,3 (2,6).

Aedeagus (Figs 31 & 32): Type B. Basiphallus narrower than distiphallus, both much broader than connections, which are slender and mostly hyaline. Basiphallus swivelled to left, thus apparently much narrower in dorsal view. Connections apically indistinct, but probably merging with posterodorsal margin of distiphallus. Distiphallus: prominently bulbous, broader basally with flattened dorsolateral ridge on each side in posterior half to two-thirds, each ridge arching upwards to mediodorsal groove position to form hemispherically enclosed area in apical one-third; medioventral groove visible in dorsal view, narrow and extending along entire ventral surface; spiral crests on apical half only, denticulations apically rounded and rarely spine-like; spines present on lateral margin of flattened ridge, from posterior margin of mediodorsal groove to about midway between this position and posterior margin.

Female. Unknown.



Figs 31–34. *Bogosia* species. 31–32. *B. grahami* sp. n., ♂ holotype. 31. Aedeagus, dorsal aspect. 32. Aedeagus, lateral aspect. (Scale = 0,5 mm, Figs 31 & 32.). 33–34. *B. rogezensis* sp. n., ♂ holotype. 33. Aedeagus, dorsal aspect. 34. Aedeagus, lateral aspect. (Scale = 0,5 mm, Figs 33 & 34.).

Material examined: Holotype ♂: GHANA: Obuasi, Ashanti, 9.vi.1907, Dr W. M. Graham, 'Caught on leaf in bush' (BMNH); paratype ♂, Obuasi, Ashanti, 11.viii.1907, Dr W. M. Graham (BMNH).

Discussion: The male of *grahami* is superficially similar to the female of *B. bequaerti* Villeneuve, 1913, in that it has similar colouring and patterning on the abdominal tergites. Females of *grahami* are unknown, but if they are similar to males, they may have been included in *bequaerti*.

The male of *grahami* is distinguished from all other species in having a type B aedeagus with denticulate/spinulose spiral crests (atypical in that other species with type B aedeagi have simple spiral crests). Other distinctive features are: face, facial ridge, parafacial and gena silver; I.P. ratio $\gg 8,0$; E.G. ratio $> 4,0$; *ph* present; legs wholly brown to black; aedeagal distiphallus prominently bulbous.

Bogusia rogezensis sp. n. Figs 33–34

Derivation: Named after the type locality in Madagascar.

Description: Based on ♂ holotype.

Male. Total length (excluding antenna) 9,0 mm; Wing length 5,0 mm.

Head: Parafrontal gold pruinose anteriorly, dark brown pruinose on posterior four-sevenths. I.P. ratio 8,3. Face, facial ridge and parafacial gold; gena silver to yellow. E.G. ratio 3,8.

Thorax: Thoracic collar present, gold pruinose. Scutum brown to black with yellow pruinosity on posterior half. Scutellum brown on basal half, testaceous on apical half. *ph* present. Pleuron silver to yellow pruinose, but underlaid with brown colouring. Coxae and trochanters testaceous; femora testaceous, but brown on apical one-eighth to one-fifth; tibiae brown; tarsi brown to black. Wing brown, but anal area and posterior margin paler. W. ratio 2,6.

Abdomen: Elongate-ovoid. Tergites testaceous, but red on lateral margins of T2–5 and dark mottled on T4–5. T2 ratio 2,5.

Aedeagus (Figs 33 & 34): Type B. Basiphallus, connections and distiphallus about subequal in width. Distiphallus: narrower in apical half; narrowly lanceolate protrusion from each posterolateral margin, 2–3 $\times$ as long as in *inconspicua*; connections merge with posteroventral margin; dorsal margin concavely arched, but not as strongly as in *antinorii*; lateral margin curved above lower dorsomedial section; spiral crests simple and prominently produced below ventral margin.

Female. Unknown.

Material examined: Holotype ♂: MADAGASCAR: Rogez, Foret Cote Est, i.1937, A. Seyrig (MNHN).

Discussion: The male of *rogezensis* is distinguished from all other species in having *ph* present and a type B aedeagus with simple spiral crests. Other distinctive features are: I.P. ratio $> 8,0$; E.G. ratio $< 4,0$.

The holotype was collected from the north-east coast of Madagascar, the furthest east the genus occurs. *B. rogezensis* is the only endemic Madagascan species.

Bogosia helva (Wiedemann, 1818) Figs 35–44

Phasia helva Wiedemann, 1818: 45 (male holotype; bon. spei., South Africa); Brauer & Bergenstamm, 1891: 388; Townsend, 1936: 50.

Phania taeniata Wiedemann, 1824: 42 (female lectotype; Cape Good Hope, South Africa), *syn. n.*

Phasia taeniata; Wiedemann, 1830: 263; Brauer & Bergenstamm, 1891: 388.

Epineura minor Villeneuve, 1913: 44–45 (male holotype; Bukama, Zaïre), *syn. n.*; Villeneuve, 1926: 65.

Epineura helva; Villeneuve, 1913: 44; Townsend, 1916: 6; Villeneuve, 1918: 508; Villeneuve, 1926: 65; Curran, 1928: 381; Villeneuve, 1938: 16.

Epineura taeniata; Villeneuve, 1913: 44; Villeneuve, 1926: 65; Curran, 1928: 381.

Bogosia similis Villeneuve, 1926: 64 (male/female (?) types; Albertville & Beni, Zaïre).

Epineura similis; Curran, 1928: 381; Villeneuve, 1938: 16.

Bogosia helva; van Emden, 1945: 428–30; van Emden, 1954: 550; Crosskey, 1980: 824 [catalogue].

Bogosia minor; van Emden, 1945: 428 & 430; Crosskey, 1980: 824 [catalogue].

Bogosia taeniata; van Emden, 1945: 428–430; Crosskey, 1980: 825 [catalogue].

Van Emden (1945) synonymised *similis* with *taeniata*, but failed to justify his decision. The types of *similis* cannot be located and Villeneuve's description could apply to a number of species. The validity of this synonymy must therefore be held in question, especially since van Emden's 1945 revision includes a number of other incorrect synonymies.

Wiedemann (1824) described *Phania taeniata* from more than one specimen, since he stated below his description that the specimens examined were 'In Museo Westermanni et nostro' (In. B. W. Westermann's collection and the Royal Museum of Copenhagen). Westermann's collection was obviously incorporated into the ZM collection after *P. taeniata* was described, since Dr Lyneborg has sent me the entire ZM collection of *Bogosia*, and the only specimen from it which could be part of the type series is labelled 'Mus Westerm'. The specimen is a female, meaning that Wiedemann was possibly unable to distinguish the sexes, since according to his description he only examined males. The specimen is identified as '*P. taeniata* Wied', and has an appropriate locality label ('Cape Good Hope'); it fits the description well. I hereby designate this female as lectotype.

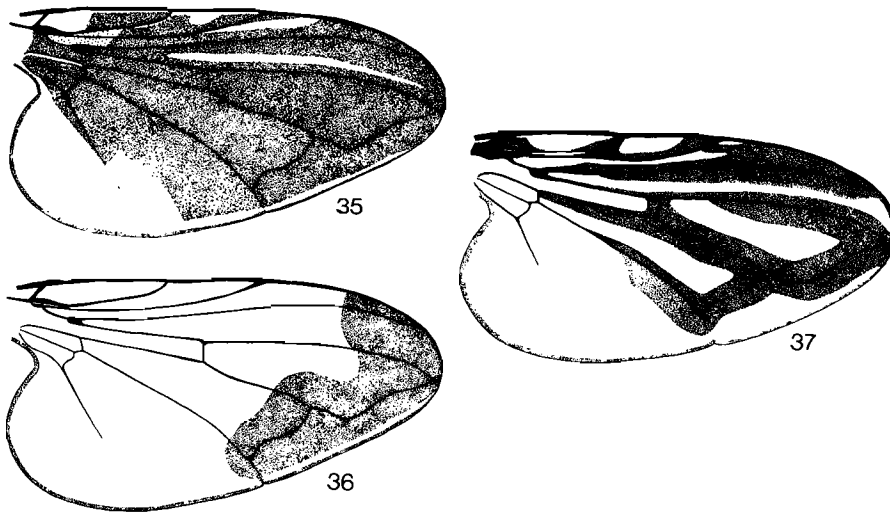
Dr Aspöck sent me a male from NMW (collected by Winthem), which she suggested (pers. comm.) was the type of *Phania taeniata*, but not only is it from the wrong repository, but it also has an inappropriate determination. [*Phasia taeniata* Wied. (*Epineura*).] *Epineura* was erected for *Phasia helva* and *Phania taeniata* by Brauer & Bergenstamm (1891).

Redescription: Based on all material examined.

Male. Total length (excluding antenna) 7,5–15,0 mm; Wing length 5,0–8,0 mm.

Head: Parafrontal wholly gold pruinose, or brown pruinose on posterior one-fifth to four-sevenths. I.P. ratio 3,2–10,0, but consistently high (8,6–10,0) in small specimens with brown wings (mostly from Vumba, Zimbabwe). Face, facial ridge, parafacial and gena gold, but lower parts of facial ridge and parafacial and entire gena rarely silver. E.G. ratio 3,0–6,0, but consistently low (3,0–3,5) in large specimens with broad wings and variously coloured/shaped abdomens from Vumba, Zimbabwe and Cape Province, South Africa.

Thorax (Figs 35–37): Thoracic collar present, pale yellow to gold pruinose, but pruinosity sometimes confined to notopleuron or apparently silver. Scutum black, often glossy brown along anterior margin, sometimes irregularly covered with silver, yellow or gold-brown pruinosity. Scutellum gold, gold and brown or brown.

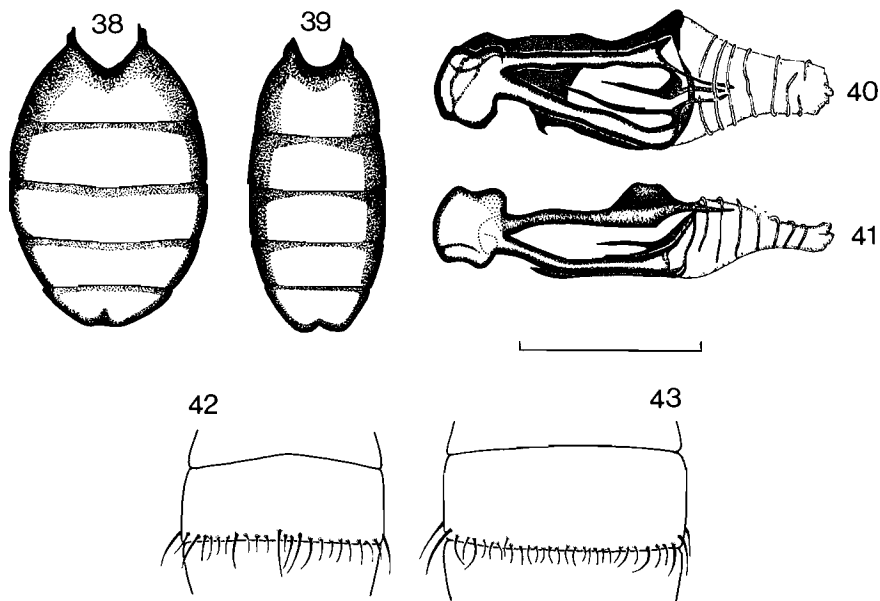


Figs 35–37. *Bogosia helva* (Wiedemann, 1818), variation in wing patterning, ♂.

ph usually present, but sometimes absent in specimens with E.G. ratio 3,0–3,5 (see *Head* section). Pleuron silver to gold pruinose, but underlaid with orange, brown or black colouring. Coxae and trochanters testaceous; fore femur usually mostly brown to black and testaceous basally (sometimes on basal two-thirds), mid and hind femora testaceous basally and brown on apical one-eighth to four-fifths, femora rarely all brown; tibiae and tarsi usually brown to black, tibiae and hind tarsus sometimes testaceous. Wing variously patterned: almost entirely brown; mostly brown, but hyaline on anal area and posterior margin, and between R_{2+3} and R_{4+5} and on costal margin (Fig. 35), sometimes more broadly so along middle of R_5 and discal cells; brown, but mostly hyaline on basal half as in *rubens* (differing in that either infuscated and hyaline areas are not clearly delineated or R_5 cell is partly hyaline); hyaline, but brown on apical margin between R_{2+3} and Cu_1 (Fig. 36), sometimes brown around *r-m* and basally; hyaline, but sometimes brown along margins of veins (Fig. 37). W. ratio 1,9–2,7, but consistently low (1,9–2,1) in large specimens with E.G. ratio 3,0–3,5.

Abdomen (Figs 38 & 39): Very variable in colour and shape, particularly large specimens with E.G. ratio 3,0–3,5. Colour variations: glossy or pruinose-brown; yellow to orange to gold (presence or absence of pruinosity and angle of light incidence influence shade of colouring on tergites); testaceous, but sometimes brown to black along posterior margins of tergites, often appearing as a median vitta. Apical 3 tergites sometimes (partially) darkened. Shape varies from ovoid (Fig. 38) to long and narrow (Fig. 39). T2 ratio 2,1–2,9.

Aedeagus (Figs 40 & 41): Type A. Basiphallus narrower than distiphallus. Connections fork apart from basiphallus to distiphallus. Distiphallus: paired filaments present; basal half and connections sometimes with sheath; connections merge with posteroventral margin and arch upwards to unite and form an apical



Figs 38–43. *Bogosia helva* (Wiedemann). 38–39. Variation in abdominal shape. ♂. 40. Aedeagus, dorsal aspect. 41. Aedeagus, lateral aspect. 42. T3 with median marginal setae, ♀. 43. T3 without median marginal setae, ♀. (Scale = 0.25 mm, Figs 40 & 41.).

prolongation, visible mediodorsally in basal half; wholly transparent; spiral crests minutely denticulate; mediodorsal groove narrowly lanceolate, if present.

Female. Total length (excluding antenna) 5.5–10.0 mm; Wing length 4.0–7.0 mm.

Head: Parafrontal brown pruinose on posterior one-fifth to six-sevenths. I.P. ratio 4.0–12.0. Face, facial ridge, parafacial and gena silver or gold. E.G. ratio 3.4–5.3

Thorax: Thoracic collar present, silver to gold pruinose, but pruinosity sometimes confined to notopleuron. Scutum usually glossy black, but sometimes brown along anterior margin; pruinosity yellow to brown, if present. Scutellum testaceous with black basal margin or entirely brown. *ph* usually present. Pleuron white to silver pruinose, but underlaid with yellow to brown colouring. Coxae and trochanters testaceous; fore femur mostly brown to black but sometimes testaceous on basal half to three-fifths, mid and hind femora testaceous basally and brown to black on apical one-eighth to two-thirds; tibiae and tarsi brown to black, but hind tibia sometimes testaceous. Wing variously patterned: mostly brown, but anal area and posterior margin sometimes paler; brown, but hyaline between R_{2+3} and R_{4+5} and along middle of R_5 and discal cells, anal area and posterior margin sometimes paler; brown, but hyaline on basal half; hyaline, but sometimes brown along margins of veins. W. ratio 2.1–2.5.

Abdomen (Figs 42 & 43): Ovoid to more elongate, but not as markedly depressed as in males. Tergites yellow to testaceous with apical 2–3 segments usually mostly darkened; testaceous form usually brown along posterior margins of T2–5, usually

with a few median marginal setae on T3 (Fig. 42), these setae usually absent in other forms (Fig. 43). T2 ratio 2,2–2,3.

Notes on male holotype: Parafrontal brown pruinose on posterior one-third. I.P. ratio 6,5. E.G. ratio 3,3. Thoracic collar gold, present between mesopleura. Scutum and scutellum mostly gold pruinose. *ph* absent. Femora testaceous with dark apices; fore and mid tibiae and tarsi brown, hind tibia and tarsi yellow to testaceous. Wing hyaline, but brown between apices of R_{2+3} and R_{4+5} and along apices of R_5 and discal cells. W. ratio 1,9. Abdomen ovoid and tergites yellow with abundant white pruinosity. T2 ratio 2,9. Total length (excluding antenna) 12,5 mm; Wing length 6,5 mm.

Material examined: *Type material*: *Phasia helva*, holotype ♂: SOUTH AFRICA: bon. spei., Wiedemann (NMW). *Phania taeniata*, lectotype ♀: SOUTH AFRICA: Cape Good Hope, i. 1817, B. W. Westermann (ZM). *Epineura minor*, holotype ♂: ZAÏRE: Bukama, 24.v.1911, Dr Bequaert (KMMA) & 1 ♂ 1 ♀ paratypes, Elisabethville, 9.iii.1912, J. Bequaert (KMMA). *Other specimens*: ZAÏRE: 1 ♂, Bambesa, v. 1934, H. J. Bredo, Parasite of *Dysdercus supersticiosus*, Incubation 15 hours (BMNH); 10 ♂ 1 ♀, Bambesa, x–xii.1933, H. J. Bredo (KMMA); 2 ♂, Bambesa, x.1933, J. Leroy (KMMA); 1 ♂, Djambi, 23.xii.1913, Dr Bequaert (KMMA); 1 ♀, Stanleyville, iv.1926, Lt. J. Ghesquière (KMMA); 1 ♀, Uele, Dingila, 15.vii.1933, J. V. Leroy (KMMA). UGANDA: 1 ♀, Budongo Forest, E. of Lake Albert, 28.viii.1971, H. Gönget (ZM); 1 ♂, Mt Kokanjero, S.W. of Elgon, 6 400 ft, 7–9. viii.1911, S. A. Neave (BMNH). KENYA: 1 ♂, Embu, 18.xii.1913, B. E. A. (BMNH); 1 ♂, Kilimandjaro, 1905–6, Sjöstedt (NR). TANZANIA: 1 ♀, Amani, 1957, J. G. Halcrow, near cattle shed (BMNH); 1 ♂, Amani, 26.i.1965, D. J. Greathead (BMNH); 1 ♂ 2 ♀, Amani, East Usambara, 1 000 m, i–ii.1977, H. Enghoff, O. Lomholdt & O. Martin (ZM); 2 ♂ 1 ♀, Amani, Usambara Mtns, 1 000 m, 5.viii.1979, M. Stoltze (ZM); 1 ♂, Chimala, 3.ii.1952 (BMNH); 3 ♂ 2 ♀, Kilossa, 1933, Werner (SMN). MALAWI: 1 ♀, Ruvo Valley, 1 000–2 000 ft, 21–25. iv.1910, S. A. Neave (BMNH). ZIMBABWE: 1 ♀, Chirinda Forest, x.1926, Arnold (NMB); 1 ♀, Mt Selinda, 4.ii.1954, N. J. Myers (NM); 16 ♂ 9 ♀, N. Vumba, iv–x.1964 & iii–xi.1965, D. Cookson (NM); 6 ♂ 1 ♀, Vumba mtns, iii.1942 (NMB, PPRI). MOZAMBIQUE: 1 ♀, Gorongoza mtn, Manica–Sofala Dist., 1 200 m, ix.1957, Stuckenberg, Montane Forest (NM). TRANSKEI: 1 ♂ 2 ♀, Port St John, x.1916 & x.1917, H. H. Swinny (PPRI); 1 ♀, Port St John, x.1923, R. E. Turner (BMNH). SOUTH AFRICA: *Transvaal*: 1 ♂ 2 ♀, Caffraria, J. Wahlberg (NR); 1 ♀, Entabeni For. Station, 2230 CC, Zoutpansberg Range, i.1975, Stuckenberg (NM). *Cape*: 2 ♂ 1 ♀, 8 km S. Alexandria, 3326 CD, 3.xi.1978, R. Miller & J. Londt, Road and forest margin (NM); 1 ♂, Cap, 1833, Wipertin (NR); 1 ♂ 1 ♀, Cap. B. Spei, Victorin (NR); 1 ♂, Cap. b. sp., Winthem (NMW); 4 ♂, Cape of Good Hope, 1.1817, B. W. Westermann (ZM); 1 ♂, Cape of Good Hope (BMNH); 1 ♀, Kloof Nek, Cape Town, 1–2.i.1972, B. M. Southern African Exp. (BMNH); 1 ♂, Somerset East, xi.1930, R. E. Turner (BMNH). *Natal*: 1 ♂, Dukuduku Forest Res., 2832 Ad, 18–19.vii.1981, Londt & Stuckenberg, Forest margins (NM); 1 ♂, Durban, x.1941, A. Cuthbertson (PPRI); 1 ♂, Durban, Bluff, 26.ii.1921, C. N. Barker

(DMAG); 4 ♂ 1♀, Durban, Umbilo, iii-xi.1913 & 27.ix.1924, A. L. Bevis (BMNH, DMAG); 1 ♂, Hluhluwe, 4-15.x.1947, G. van Son (NM); 1 ♂, Malvern, iii.1897, G. A. K. Marshall (BMNH); 1 ♀, Mkuzi Game Res., i.1947, H. K. Munro (NCI); 1 ♀, Mtamvuna Nature Res., 3130 Aa, 10-15.i.1982, J. G. H. Londt, Malaise (NM); 1 ♂, Ndumu Game Reserve, 4-9.x.1982, J. G. H. Londt (NM); 2 ♂, Umhlanga Bush near Durban, ii.1963, B. & P. Stuckenberg, From coastal forest (NM); 1 ♀, Winklespruit, 20.xii.1918, C. N. Barker (BMNH).

Discussion: *B. helva* is subject to much intraspecific variation in males, which, together with the fact that marked sexual dimorphism often occurs, has resulted in the description of two synonyms.

B. helva and *B. bequaerti* males are sometimes indistinguishable, even with examination of the aedeagi, but are always very easily identified if associated females of each species are available. The highly distinctive *bequaerti* female is the only female to have the abdominal tergites brown to black, with only the lateral margins of T2, T3 and sometimes T4 wholly or partly testaceous. The female of *helva* always has the basal two tergites entirely yellow to testaceous. The male of *helva* is distinguished from all species, except *bequaerti*, by the following combination of characters: parafrontal gold anteriorly, facial ridge yellow to gold on upper half, T2 ratio > 2.0 and < 2.9 , aedeagus of type A, aedeagal connections obvious in lateral view, aedeagal connection-distiphallus junction without forwardly protruding lobe-like projection, and aedeagal distiphallus with spiral crests minutely denticulate.

B. helva is described mainly according to the form of the aedeagus, and the nature of colouring and patterning on the abdominal tergites of the female. Use of such characters is essential, since examination of external characters of males only, can result in the recognition of a number of apparently distinct species. Although morphs appear to be sex limited in certain localities, this does not occur throughout the species range, and some forms do not exhibit any marked sexual dimorphism. True polymorphism occurs in males, since the different morphs are sometimes sympatric. Females are polymorphic (unlike in *B. bequaerti*), but not as strongly so as in males.

The holotype of *Phasia helva* and the lectotype of *Phania taeniata* belong to a form of *B. helva* where males and females are strongly dimorphic. The holotype of *Phasia helva* is a male with broad, apically infuscated wings, while the lectotype of *Phania taeniata*, a female, has the wings narrower and mostly brown and the abdomen more compressed. *B. helva* females are the only females known from the western Cape, and according to Dr Lyneborg (pers. comm.), the female lectotype of *P. taeniata* was collected near Cape Town.

Dr Lyneborg suggests (pers. comm.) that four males of *B. helva* in ZM are syntypes of *Phasia helva*. I disagree, since none of the specimens was collected by Wiedemann or labelled '*helva* Wd Type' and '*Ph. helva* mihi', as with the male I am assuming to be the holotype in NMW. The 'mihi' could only mean that the determination labelling is in Wiedemann's hand. In addition, the four males are subject to size and colour variations (Wiedemann's description does not discuss colour variations and no size range is given), and although all the specimens are from B. W. Westermann's collection (either collected by him or with the

appropriate label), this repository is not given below the description as it was with *Phania taeniata*.

Villeneuve (1913, 1926) considered *helva* and *taeniata* to be closely related, but did not synonymise *taeniata* with *helva*. Van Emden (1945) distinguished the two species according to wing patterning and sexual dimorphism.

B. minor is synonymous with *helva*, since it has the typical *helva* aedeagus, as well as similar tergal colouring and patterning in the female. The *minor* type series is similar to a number of small specimens of *helva* from Vumba, eastern Zimbabwe. They all have brown wings and the I.P. ratio $\geq 8,0$ in males. Van Emden (1945) confused *minor* with *rubens*.

B. helva is confined mainly to the eastern half of the African mainland, south of the equator (Fig. 44). It is the only species known from the western Cape Province of South Africa, and therefore occurs further south than any other species. Adults occur most commonly in coastal and montane forest. The only host record is *Dysdercus supersticiosus* (Pyrrhocoridae).

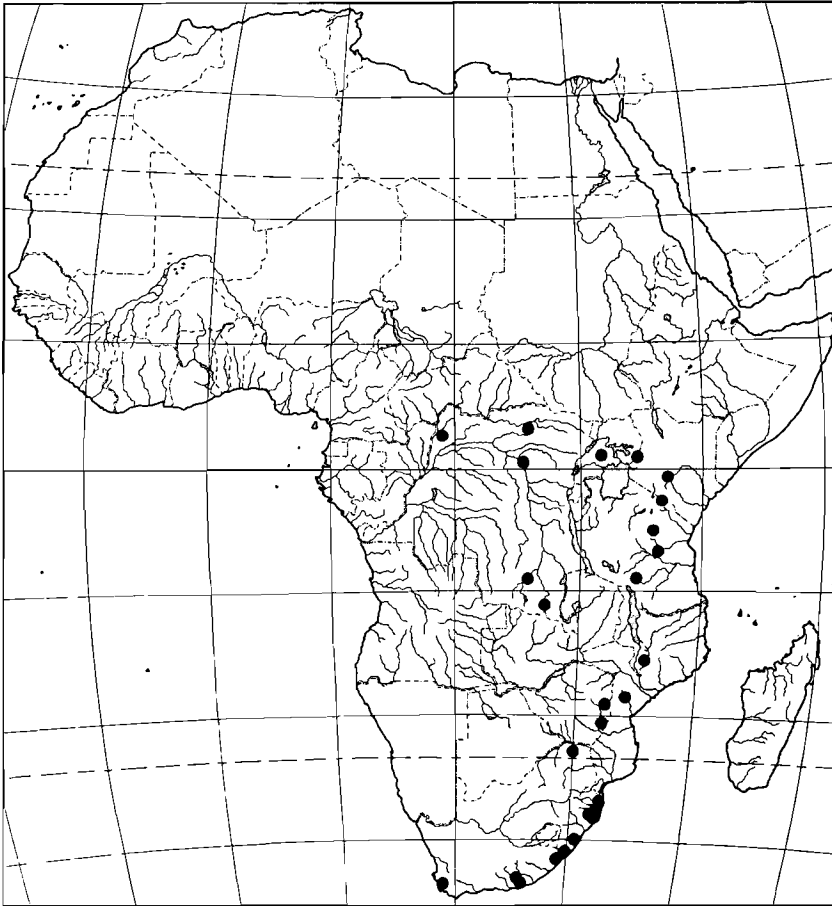


Fig. 44. *Bogosia helva* (Wiedemann), distribution.

Bogosia argentea sp. n. Figs 45–46

Derivation: L. *Argenteus* = silvery. Refers to the faintly silver thoracic collar.

Description: Based on ♂ holotype, but supplemented with information from ♂ paratypes (in parentheses).

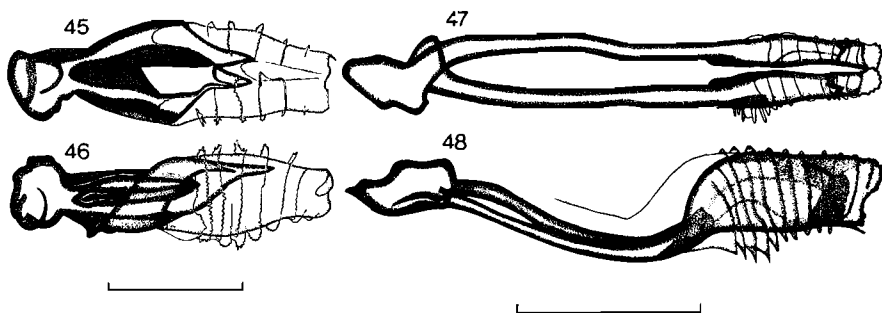
Male. Total length (excluding antenna) 10,5 mm (8,5 mm); Wing length 6,0 mm.

Head: Parafrontal silver to pale yellow (entirely yellow) pruinose anteriorly, and black (brown to black) pruinose on posterior six-sevenths (four-sevenths). I.P. ratio 6,2 (6,1–6,8). Face silver to yellow; facial ridge, parafacial and gena silver (parafacial yellow on upper half). E.G. ratio 3,3 (3,2–3,3).

Thorax: Thoracic collar present but indistinct, faintly silver pruinose. Scutum black with faint silver pruinosity on posterior half. Scutellum black. *ph* present, but weakly developed (absent, sometimes on one side only). Pleuron silver pruinose, but underlaid with black colouring. Coxae and trochanters testaceous; fore femur brown to black, mid femur brown to black but partly testaceous on basal one-third (one-half), hind femur testaceous on basal half (three- to four-fifths) and brown to black apically; tibiae and tarsi black (brown to black). Wing brown, but hyaline on anal area and paler on posterior margin. W. ratio 2,3 (2,4–2,6).

Abdomen: Ovoid, somewhat compressed. Tergites testaceous (irregular black mottling on T4–6). T2 ratio 2,9 (3,1–3,4).

Aedeagus (Figs 45 & 46): Type A. Basiphallus narrower than distiphallus. Connections fork apart from basiphallus to distiphallus. Distiphallus: paired filaments present; connections ensheathed, sheath curves upwards from ventral margin of right connection (both connections) along about half outer margin; connections merge with lateroventral margins and arch upwards with sheath on each side, to unite and form an apical prolongation, visible mediodorsally as an M-shaped cross-connection in basal half; wholly transparent; spiral crests with at least some prominently denticulate; mediodorsal groove along about anterior half to two-thirds, each side therefore with separate series of spiral crests.



Figs 45–48. *Bogosia* species. 45–46. *B. argentea* sp. n., ♂ paratype. 45. Aedeagus, dorsal aspect. 46. Aedeagus, lateral aspect (sheathing arching over left connection omitted). (Scale = 0,25 mm, Figs 45 & 46.). 47–48. *B. curvaverpa* sp. n., ♂ holotype. 47. Aedeagus, dorsal aspect. 48. Aedeagus, lateral aspect. (Scale = 0,5 mm, Figs 47 & 48.).

Female. Total length (excluding antenna) 8,5–9,5 mm; Wing length 6,5 mm. As for male, except:

Head: Parafrontal silver pruinose anteriorly, and black to brown to black. W. ratio 2,5.

Abdomen: T2 ratio 3,3–3,8.

Material examined: *Type material*: Holotype ♂: ANGOLA: Chianga (A36), 21–24.iii.1972, B. M. Southern African Exp. (BMNH). Paratypes: ZAMBIA: 1 ♀, Luapula Province, 12.ix.1959, P. Johnsen (ZM). SOUTH AFRICA: 3 ♂ 1 ♀, Lomati River Headwaters, Barberton–Havelock Rd, 2531 CC, 1 175 m, 25.ii.1971, Stuckenberg, Montane meadow (NM). *Other specimen*: SOUTH AFRICA: 1 ♂, Pretoria, ii.1914, Miss J. Brincker (BMNH).

Discussion: The male of *argentea* is superficially similar to *antinorii*, but is distinguished in having the thoracic collar present (but only faintly so), the scutellum black and the aedeagus of type A. It is distinguished from all other species on the following combination of characters: parafrontal silver to yellow pruinose anteriorly; facial ridge entirely silver; E.G. ratio $\leq 3,3$; thoracic collar silver pruinose and indistinct; fore femur wholly brown to black; T2 ratio nearly always $\geq 3,0$; type A aedeagus with prominently denticulate spiral crests. *B. antinorii* is the only other species to have T2 broad (T2 ratio $> 3,0$). *B. argentea* is known only from southern Africa.

***Bogusia curvaverpa* sp. n. Figs 47–48**

Derivation: L. *Curvus* = bent; *verpa* = penis. Refers to the upwardly arched connections of the aedeagus.

Description: Based on ♂ holotype, but supplemented with information from ♀ paratype.

Male. Total length (excluding antenna) 10,5 mm; Wing length 7,5 mm.

Head: Parafrontal gold pruinose anteriorly, and black pruinose on posterior four-sevenths. I.P. ratio 5,9. Face, facial ridge and gena yellow; parafacial yellow, but gold on upper part. E.G. ratio 3,7.

Thorax: Thoracic collar present, gold pruinose. Scutum brown to black with faint silver pruinosity on posterior half. Scutellum brown on basal half and testaceous on apical half. *ph* absent. Pleuron with silver pruinosity (gold on mesopleuron), but underlaid with brown colouring. Coxae and trochanters testaceous; fore femur testaceous basally and brown on apical half, mid and hind femora testaceous basally and brown on apical one-third to half; tibiae and tarsi brown to black. Wing brown, but hyaline on anal area. W. ratio 2,5.

Abdomen: Fairly elongate. Tergites testaceous. T2 ratio 2,1.

Aedeagus (Figs 47 & 48): Type B. Basiphallus, connections and distiphallus all about subequal in width. Connections arch upwards near junction with distiphallus.

Distiphallus: connections merge with posteroventral margin; posterodorsal margin rather strongly concavely arched; spiral crests simple and prominently produced below ventral margin; mediodorsal groove along entire length, dividing structure into 2 halves, each half therefore with separate series of spiral crests.

Female. Total length (excluding antenna) 10,0 mm; Wing length 7,5 mm. As for male, except:

Head: Parafrontal yellow pruinose anteriorly, and black pruinose on posterior three-sevenths. I.P. ratio 6,5. Face and facial ridge silver to yellow; parafacial and gena silver. E.G. ratio 3,8.

Thorax: W. ratio 2,4.

Abdomen: Elongate-ovoid.

Material examined: Holotype ♂, paratype ♀: IVORY COAST: Bouaké, xii. 1945, Delattre (MNHN).

Discussion: The male of *curvaverpa* resembles *B. rufiventris* Bigot, 1876, but is distinguished in having *ph* absent and the aedeagus of type B. It is distinguished from all other species in having the combination of these two characters and the T2 ratio $> 2,0$ and $< 3,0$.

Bogusia bequaerti Villeneuve, 1913 Figs 49–58

Bogusia bequaerti Villeneuve, 1913:45 (female holotype; Kibombo, Zaïre); van Emden, 1945:428–429; Crosskey, 1980:824 [catalogue].

Bogusia helva; van Emden, 1945:427–430 (part); Crosskey, 1980:824 (part) [catalogue].

Redescription: Based on all material examined.

Male. Total length (excluding antenna) 8,5–16,0 mm; Wing length 5,0–9,5 mm.

Head: Parafrontal as in *helva*. I.P. ratio 3,2–7,0. Face, facial ridge and parafacial gold; gena usually yellow, but sometimes silver. E.G. ratio 3,6–6,0.

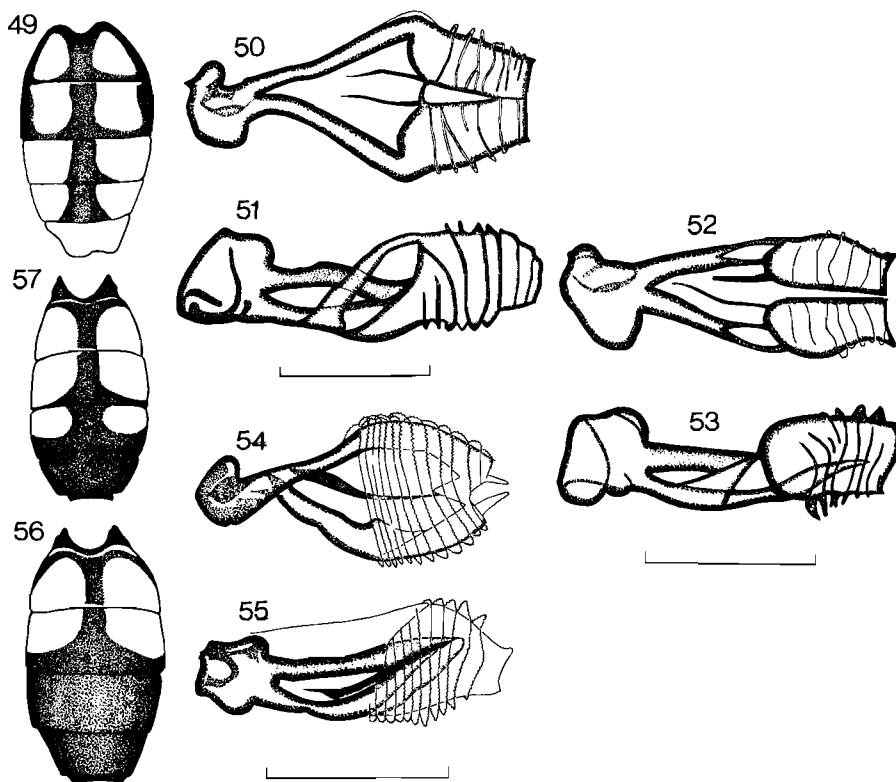
Thorax: Thoracic collar as in *helva*. Scutum testaceous, brown or black; pruinosity silver, yellow or gold, sometimes absent along anterior margin. Scutellum yellow to gold (sometimes also partly testaceous or brown) or mostly brown to black with silver, yellow or gold pruinosity. *ph* always present on at least 1 side (absent on a specimen from Bambesa, Zaïre). Pleuron silver to yellow pruinose, but underlaid with yellow, orange, brown or black colouring. Coxae usually testaceous, but mid and hind coxae sometimes brown; trochanters testaceous; fore femur testaceous basally and brown or black on apical one-third to almost wholly brown or black, mid and hind femora entirely testaceous or brown on apical one-eighth to three-fifths; fore and mid tibiae testaceous to brown-black, hind tibia testaceous to brown; fore and mid tarsi testaceous to brown, hind tarsus usually mostly testaceous but sometimes brown. Wing variously patterned: almost entirely brown; hyaline, but brown on apical margin between R_{2+3} and Cu_1 (as Fig. 36), sometimes brown on basal section of discal cell and along its lower margin, along *M*, along basal half of R_{4+5} , along basal one-third of R_{2+3} and along *Sc*; hyaline, but brown along margins of veins (as Fig. 37), but brown absent along most of posterior margin of R_{2+3} , sometimes entirely brown between R_{4+5} and *M* before *r-m*; hyaline, but brown along margins of veins on apical half; hyaline, but very pale brown on

apical two-fifths; hyaline, but brown along apical margin of discal cell and along bend of *M*; hyaline, but brown along R_{2+3} ; entirely hyaline. W. ratio 1,9–2,7.

Abdomen (Fig. 49): Very variable in colour and shape. Colour variations: brown to black with silver or gold pruinosity; orange to testaceous-brown (presence or absence of pruinosity and angle of light incidence influence shade of colouring on tergites), but apical 3 tergites mostly black; testaceous, but T1–3 usually with brown to black median vitta and T4–6 darkened, T1–3 sometimes with lateral margins darkened; testaceous, but T1/2–T5/6 with brown to black median vitta, T1–3 sometimes with brown lateral margins extending along posterior margins to meet vitta on midline (Fig. 49). Shape varies as in *helva*. T2 ratio 2,1–2,9.

Aedeagus (Figs 50–55): Type A. Very variable, with 3 basic forms, but with intermediates between each form:

1. (Figs 50 & 51): Distiphallus 1,5–2,0 × as wide as basiphallus. Connections fork apart from basiphallus to distiphallus, sometimes with sheath. Distiphallus: paired filaments present, but usually barely visible; connections merge with posteroventral



Figs 49–57. *Bogosia bequaerti* Villeneuve, 1913. 49. Abdomen, dorsal aspect, ♂. 50–51. Aedeagal form 1. 50. Dorsal aspect. 51. Lateral aspect. 52–53. Aedeagal form 2. 52. Dorsal aspect. 53. Lateral aspect. 54–55. Aedeagal form 3. 54. Dorsal aspect. 55. Lateral aspect. 56–57. Variation in tergal patterning, ♀. (Scale = 0,25 mm. Figs 50–55.).

margin; spiral crests prominent and simple; mediodorsal groove along most of length, each side therefore with separate series of spiral crests; posterodorsal margin concavely rounded on each side.

2. (Figs 52 & 53): Basiphallus and distiphallus subequal in width, and posterodorsal margin not as broadly rounded on each side.

3. (Figs 54 & 55): Basiphallus and distiphallus subequal in width, or distiphallus up to $3,5 \times$ as wide as basiphallus and distinctly more globular. Connections fork apart from basiphallus to distiphallus. Distiphallus: paired filaments present, but often compressed and sometimes visible within posterior half; basal section and connections sometimes with sheath; connections merge with lateral margins, sometimes arching upwards to converge or unite and form an apical prolongation with an M-shaped cross-connection, visible mediodorsally in basal half; sometimes wholly transparent; spiral crests often denticulate and sometimes more numerous than in other forms; mediodorsal groove often present, sometimes along entire length; posterodorsal margin merges obliquely with connection on each side.

Female: Total length (excluding antenna) 5,0–11,5 mm; Wing length 3,5–7,5 mm.

Head: Parafrontal brown to black pruinose on posterior two- to six-sevenths, sometimes almost wholly black, but then silver pruinose on outer part of anterior one-sixth. I.P. ratio 4,5–13,6. Face and facial ridge gold, but rarely silver; parafacial gold or silver, sometimes silver on lower half only; gena silver to yellow. E.G. ratio 4,3–5,9.

Thorax: Thoracic collar present, silver to gold pruinose, but pruinosity sometimes confined to notopleuron. Scutum brown to black, sometimes with glossy brown band along anterior margin; pruinosity silver, yellow or brown, if present. Scutellum testaceous (sometimes also brown along basal margin), occasionally with yellow to brown pruinosity, or brown to black, sometimes with silver pruinosity. *ph* present on at least 1 side. Pleuron silver to yellow pruinose, but underlaid with yellow, brown or black colouring. Coxae and trochanters usually testaceous, but fore and mid coxae and trochanters sometimes brown; fore femur testaceous basally and brown to black on apical one- to two-thirds (sometimes wholly brown to black), mid and hind femora testaceous basally and brown to black on apical one-quarter to four-fifths (rarely wholly brown to black); tibiae and tarsi brown to black, but hind tibia sometimes testaceous. Wing variously patterned: entirely brown, but sometimes paler or hyaline on anal area and posterior margin; brown, but hyaline along basal half of *C* and on posterior margin; brown, but hyaline streak on apical half of discal and R_5 cells and sometimes between R_{2+3} and R_{4+5} , sometimes hyaline on anal area and posterior margin; brown, but hyaline on basal one-third, sometimes with hyaline streak between R_{2+3} and R_{4+5} ; hyaline, but brown along margins of veins; entirely hyaline. W. ratio 2,3–2,7.

Abdomen (Figs 56 & 57): Ovoid, but sometimes somewhat narrower. Tergites dark brown to black, but with a pair of laterally placed ovoid translucent-testaceous markings, extending from anterior margin of T2 to near posterior margin of T3, so that these 2 tergites have a medially biconcave vitta (Fig. 56). Vitta occupies one-fifteenth to one-third of T2/3 width. T4 sometimes with hemispherical testaceous markings extending backwards along anterior half to two-thirds of lateral margins.

Tergites rarely almost entirely brown, with lateral margins of T2 and anterior one-third of T3 lateral margins slightly testaceous, or testaceous markings on mid-lateral margins of T2 and on anterolateral margins of T3. T5 often silver pruinose on lateral margins. T2 ratio 1.9–2.9.

Material examined: GUINEA: 2 ♂ 1 ♀, Nimba, 2.vi.1942, M. Lamotte (MNHN); 1 ♂, N'Zérékoré, 20.iii.1950, H. Olsen (ZM). IVORY COAST: 1 ♂, Adiopodoumé, 17.xi.1948, Jover (MNHN); 2 ♂, Daloa, xii.1930–iv.1931, Ch. Alluaud & P. A. Chappuis (MNHN); 1 ♂, Kouibly, xii.1938, L. Chopard (MNHN); 1 ♂ 1 ♀, Tai, 15–20.viii.1978, G. Couturier, Forêt dense sempervirente (MNHN). GHANA: 1 ♂, Edusii, Ashanti, 13.i.1908, Dr W. M. Graham (BMNH); 1 ♀, Kumasi, 30.vi.1947, J. Bowden, In cocoa (NM); 1 ♀, Nyabo, 24.iii.1947, J. Bowden (NM); 4 ♂ 8 ♀, Obuasi, Ashanti, vi–xi.1907 & 2.viii.1908, Dr W. M. Graham (BMNH); 1 ♀, Offinsii, 20.iv.1949, J. Bowden (NM). NIGERIA: 1 ♂, 1901, A. H. Hanley (BMNH); 1 ♂, 1912, J. J. Simpson (BMNH); 1 ♀, British Cameroons, Kumba, 28.x.1949, H. Oldroyd (BMNH); 1 ♂, West Cameroons, Kumba, Bille Riv., 10.iv.1968, R. H. L. Disney (BMNH). CAMEROON: 1 ♂, Yaoundé-N'Kolbisson, 8.viii.1967, L. Matile (MNHN). GABON: 1 ♀, Ipassa Piste Panthère, 11–16.v.1974, Mission M. Donskoff et J. Le Breton, Malaise (MNHN); 2 ♂ 8 ♀, Lambaréné, 1911/12, R. Ellenberger (MNHN); 1 ♂, Oyem (MNHN); 1 ♀, Riv. San Benito, 1885, Guiral (MNHN). CONGO: 1 ♂, Bas-Oubangi, Mission Hottot, 1909, Dr Poutrin (MNHN); 1 ♂ 1 ♀, Mbomo-Nord-Congo, Route du Gabon, 8.xi.1977, S. Kelner-Pillault (MNHN). ZAÏRE: 21 ♂ 1 ♀, Bambesa, ix–xii.1933, H. J. Bredo (KMMA); 8 ♂ 1 ♀, Bambesa, viii–xii.1933 & i.1934, J. V. Leroy (KMMA); 1 ♂, Bambesa, 2.i.1939, J. Vrydagh (KMMA); 1 ♀, Bas-Ibile-Gô, 15.xii.1925, G. F. de Witte (KMMA); 1 ♀, Benza-Masola, 12/15.vi.1913, R. Mayné (KMMA); 1 ♂, Garamba, vii.1912, Exp. Lang-Chapin (KMMA); 1 ♂, Ituri-Matinda, 15.xi.1929, A. Collart (KMMA); 1 ♂ 1 ♀, Kapanga, xi.1933, G. F. Overlaet (KMMA); 1 ♂, Kisanga, Katanga, iii.1928, F. G. Overlaet (KMMA); 3 ♂, Lulua, Kapanga, x.1932 & iv/v.1933, G. F. Overlaet (BMNH, KMMA); 3 ♂, Mayumbe, Zobe, i.1916, R. Mayné (KMMA); 1 ♂, Mwene-Ulamba, Katanga, 5.xii.1925, F. G. Overlaet (KMMA); 1 ♂, N'Gomo, Bas Ogooue, 1906, E. Haug (MNHN); 1 ♀, Rutshuru, 14.v.1936, L. Lippens (KMMA); 1 ♂, Stanleyville, ii.1915, Dr Bequaert (KMMA); 2 ♂ 1 ♀, Tshibinda, 21–27.viii.1931, Prof. T. D. A. Cockerell, Miss A. Mackie & J. Ogilvie (BMNH). UGANDA: 1 ♀, Buddu (Northern), 3 800 ft, 16–18.ix.1911, S. A. Neave (BMNH); 1 ♂, Budongo Forest, Bunyoro, iv–v.1954, van Someren (BMNH); 1 ♂, Bugoma Forest, Bunyoro, v.1954, van Someren (BMNH); 1 ♀, Bwamba Country, 1938, J. O. Harper (BMNH); 1 ♂, Jinja, ix.1928, Dr van Someren (BMNH); 1 ♀, Kafu R. near Hoima, Kampala Rd, 3 500 ft, 29–31.xii.1911 (BMNH); 2 ♀, Masindi, 29.i.1964 (BMNH); 1 ♀, Mpanga Forest, 20.iii.1958, J. Bowden (NM); 1 ♂, Semliki Plains, near S. shore of Lake Albert, 2 200 ft, 25–27.xi.1911, S. A. Neave (BMNH). KENYA: 1 ♂, Kakamega Forest, 5 200 feet, 18.xii.1970, A. E. Stubbs (BMNH). RWANDA/BURUNDI: 2 ♀, x.1956, N. L. H. Krauss (BMNH). TANZANIA: 1 ♂, Kilossa, 1933, Werner (SMN). ANGOLA: 1 ♀, Salazar, 9–15.iii.1972, B. M. Southern African Exp. (BMNH). MALAWI: 1 ♂ 3 ♀, Mt Mlanje, 21.xi.1912, 2.ii.1913,

9.x.1913 & 21.i.1914 S. A. Neave (BMNH); 1 ♂, Mlanje, 2 000 ft, 7.xii.1944, R. C. Wood (BMNH). MOZAMBIQUE: 1 ♀, Siluwe Hills west of Beira, 16.xi.1963, D. Cookson (NM). ZIMBABWE: 2 ♂, Bomponi, Vumba, 16.v.1965 & 23.vi.1965, D. M. Cookson (NM); 2 ♂, E. Vumba, 18.v.1964 & 1.vi.1964, D. Cookson (NM). TRANSKEI: 1 ♀, Port St John, 5–30.iv.1923 (BMNH). SOUTH AFRICA: *Transvaal*: 1 ♂ 1 ♀, Barberton, 19–26.iii.1920, G. v. D/A. Rob (PPRI, NM). *Natal*: 1 ♀, Blackridge, Pietermaritzburg, v.1974, B. & P. Stuckenberg (NM); 1 ♀, Durban (BMNH); 1 ♂, Durban, 2.iii.1924, H. W. Bole (PPRI); 1 ♀, Durban, 12.v.1906, G. Leigh (NM); 1 ♀, Durban, Bluff, 12.iv.1919, C. N. Barker (DMAG); 1 ♀, Near Lilani, Ahrens District, iv.1962, B. & P. Stuckenberg (NM); 1 ♀, Mposa, Zululand, x.1951, H. K. Munro (NCI); 2 ♂ 2 ♀, Stella Bush, Durban, ii.1915, Marley (PPRI); 1 ♂, Stella Bush, Durban, 3.vii.1917, C. N. Barker (DMAG); 1 ♀, Umbilo, Durban, 3.x.1913, L. Bevis (DMAG).

Discussion: *B. bequaerti* is subject to much intraspecific variation in males, and unlike all other species, the type A aedeagus is variable in form.

B. bequaerti is distinguished from all other species in having the abdominal tergites of the female dark brown to black, usually with only the lateral margins of T2 and T3 translucent–testaceous. Females of other species have T2 and T3 entirely yellow, testaceous or red. The male usually has a similar external form to *helva*, and even the aedeagus is sometimes indistinguishable from that of the last species. However, the following aedeagal characters of *bequaerti* never occur in *helva*: spiral crests prominent and/or simple; distiphallus with posterodorsal margin concavely rounded on each side. Thus as with *helva*, *bequaerti* is described according to aedeagal form in the male, and the nature of colouring and patterning on the abdominal tergites of the female.

B. bequaerti is the only species in which sexual dimorphism always occurs. Males are truly polymorphic, since the different morphs are sometimes sympatric. Females are relatively constant in form.

The holotype of *bequaerti* could not be traced. Villeneuve's description of the holotype (a female, since he stated that the claws and pulvilli are short) includes reference to most important specific features: whole of the frons blackish; abdomen black, with first and second segments pale reddish laterally; wings totally black; legs black. The holotype was collected in eastern Zaïre, which is within the geographical range of both males and females identified as this species (Fig. 58).

B. bequaerti has commonly been misidentified as *helva*. Van Emden (1945) lists only two specimens under *bequaerti*, the remainder, including the distinctive females, were considered to be *helva*. Van Emden separated *bequaerti* from *helva* according to differences in parafrontal dark dusting and wing patterning, and the presence or absence of teeth on the spiral crests of the aedeagal distiphallus. However, none of these characters can reliably separate the two species.

B. bequaerti is very widely distributed, and occurs further west on the African mainland than any other species. It occurs between 9°N and 32°S and between 9°E and 37°E, and is probably the most commonly encountered species (Fig. 58).

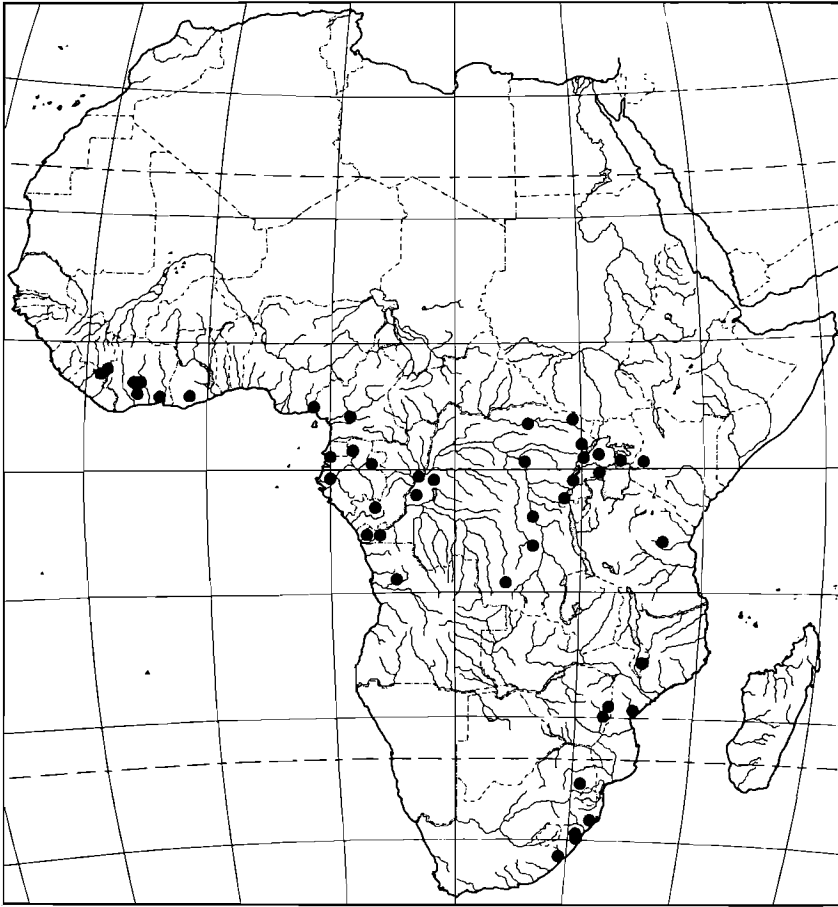


Fig. 58. *Bogosia bequaerti* Villeneuve, distribution.

Bogosia rufiventris Bigot, 1876 Figs 59–60

Bogosia rufiventris Bigot, 1876: 399–400 (male holotype; Natal, South Africa).

Epineura rufiventris; Villeneuve, 1913: 44–45; Villeneuve, 1926: 65.

Bogosia taeniata; van Emden, 1945: 428–430 (part); Crosskey, 1980: 825 (part) [catalogue].

Redescription: Based on all material examined.

Male. Total length (excluding antenna) 9,5–12,0 mm; Wing length 5,5–7,5 mm.

Head: Parafrontal gold (rarely silver) pruinose anteriorly, and brown to black pruinose on posterior two-fifths to four-sevenths. I.P. ratio 3,2–5,1. Face, facial ridge and parafacial gold; gena silver to gold. E.G. ratio 3,5–3,7.

Thorax: Thoracic collar present, yellow to gold pruinose, but pruinosity usually more prominently gold on notopleuron and faint to absent between notopleura. Scutum brown to black with faint silver pruinosity on posterior half, but pruinosity rarely gold or absent. Scutellum testaceous, but often black on basal half and sometimes entirely black. *ph* present. Pleuron silver to gold pruinose, underlaid

with brown colouring, but rarely black and parts of mesopleuron, sternopleuron and pteropleuron sometimes yellow. Coxae and trochanters testaceous; fore femur brown to black but testaceous basally, mid and hind femora testaceous basally and brown to black on apical one-eighth to two-fifths (rarely brown on apical three- to four-fifths); tibiae and tarsi brown to black. Wing brown to black, often paler on anal area and posterior margin, sometimes hyaline along C , and paler between R_{2+3} and R_{4+5} and on middle of R_5 and discal cells. W. ratio 2,3–2,5.

Abdomen: Elongate-ovoid, sometimes bluntly tapered. Tergites testaceous, but T4–6 sometimes partly brown to black. T3 without median marginal setae. T2 ratio 2,1–2,9.

Aedeagus (Figs 59 & 60): Type A. Basiphallus narrower than distiphallus. Connections fork apart from basiphallus to distiphallus. Connection-distiphallus junction with inner margin of each connection produced into a forwardly protruding lobe-like projection, visible in dorsal and lateral views, each projection coincident with a prominent filament. Distiphallus: sheath arching upwards from beneath connection on each side, along posterolateral margins, to unite and form an apical prolongation, visible mediodorsally as an M-shaped cross-connection in basal half; wholly transparent; spiral crests denticulate; mediodorsal groove sometimes present.

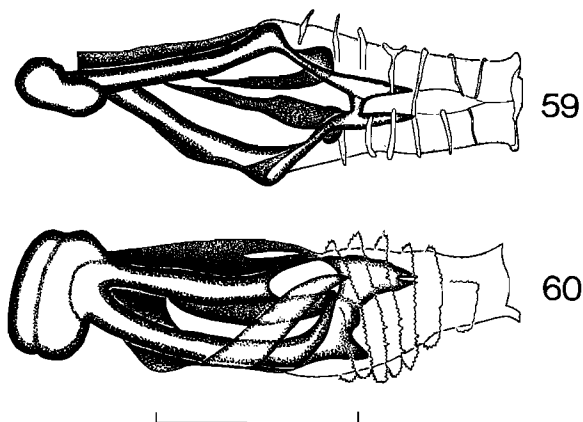
Female. Total length (excluding antenna) 9,5–11,0 mm; Wing length 6,5–7,5 mm. As for male, except:

Head: I.P. ratio 3,5–5,1.

Thorax: Fore femur sometimes only brown on apical two-fifths.

Abdomen: Tergites testaceous to orange. T2 ratio 2,0–2,7.

Notes on male holotype: The holotype is in poor condition. Parafrontal brown pruinose on posterior half to four-sevenths. I.P. ratio 4,2. E.G. ratio 3,6. Thoracic



Figs 59–60. *Bogosia rufiventris* Bigot, 1876. 59. Aedeagus, dorsal aspect. 60. Aedeagus, lateral aspect. (Scale = 0,25 mm, Figs 59 & 60.).

collar gold pruinose on notopleura, but rather faintly so inbetween. Wing pale brown. W. ratio 2,4. Abdominal tergites testaceous. T2 ratio 2,4. Total length (excluding antenna) 11,5 mm; Wing length 7,0 mm.

Material examined: *Type material*: Holotype ♂: SOUTH AFRICA: Natal, J. Bigot (BMNH). *Other specimens*: CAMEROON: 1 ♂, Youndé-N'Kolbisson, 24.vii.1967 (MNH). CONGO: 1 ♀, Dimonika, 18–30.i.1977, S. Kelner-Pillault, s/chemin près des cases du haut (MNH); 1 ♀, Makaba, 22.i.1977, S. Kelner-Pillault, bordure de route près cases abandonnées (MNH). ZAÏRE: 1 ♂, Reg. Lac Kivu, Kadjudju, 1930, G. Babault (MNH). TANZANIA: 1 ♀, East Usambara, Amani, 1 000 m, 1.ii.1977, H. Enghoff, O. Lomholdt & O. Martin (ZM); 1 ♀, East Usambara, Amani, 1 000 m, 23.xii.1975, O. Lomholdt (ZM). MALAWI: 1 ♂, Cholo, R. C. Wood (BMNH); 1 ♀, 8 km S.E. Mulanje Village, 1635 Ba, Ca 800 m, 30.xi.1980, Stuckenberg & Londt, Riverine Gallery Forest (NM). ZIMBABWE: 4 ♂ 1 ♀, Glenlivet, 8.xi.1955 (NMB); 1 ♂, Matetsi, iv.1934, R. H. R. Stevenson (BMNH). TRANSKEI: 2 ♂, Umgazi Mouth, 3129 Da, 20.x.1972, M. E. Irwin, 3–10 m coastal dunes (NM). SOUTH AFRICA: *Transvaal*: 2 ♂, Lichtenberg, Dr Brauns (PPRI, SMN); 1 ♂, Pretoria, 30.xi.1907, A. J. T. Janse (NM); 1 ♀, Pretoria, xii.1900, V. Jutr (NM); 1 ♀, Sterkfontein, 1900, H. P. Thomasset (BMNH). *Cape*: 2 ♂, 8 km S. Alexandria, 3326 CD, 3.xi.1978, R. Miller & J. Londt, Road & forest margin (NM). *Natal*: 1 ♂, Durban, x.1941, A. Cuthbertson (NM); 1 ♀, Manguzi river nr Maputa, xi–xii.1945, H. Bell-Marley (DMAG); 1 ♂, Natal National Park, iii.1932, J. Ogilvie (BMNH); 1 ♂, Port Natal, vi.1897, Gueinzeus (BMNH); 1 ♀, Town Bush, Pietermaritzburg, xi.1959, B. & P. Stuckenberg (NM).

Discussion: *B. rufiventris* is very closely related to *helva*, and although I consider the two species to be distinct, it is possible that the examination of a longer series of *rufiventris*, will show variation in those characters which hold it distinct from *helva*.

B. rufiventris is distinguished from *helva* by the following combination of characters: male and female always very similar; wing usually mostly brown to black; abdomen without variation in shape and colouring; aedeagus with connection-distiphallus junction having distinctive forwardly protruding lobe-like projection on each side. Females of *helva* have the apical two to three tergites darkened, but if not so T3 has median marginal setae; females of *rufiventris* never have the apical two to three tergites darkened or median marginal setae present.

Villeneuve (1913, 1926) considered *rufiventris* to be very closely related to *helva* and *taeniata*. Van Emden (1945) synonymised *rufiventris* with *taeniata* on the basis of abdominal and wing colouring.

B. rufiventris occurs most commonly in south-east Africa, but also seems to have a rather scattered distribution in equatorial areas between Tanzania and Cameroon (four localities only). It is known from coastal and montane forest.

REFERENCES

- BIGOT, J. M. F. 1876. Diptères nouveaux ou peu connus. 6^e partie. VIII. Curie des Phasides (Phasidae, mih). Genres *Trichopoda* (Macq.) et *Bogosia* (Rond.) *Annales de la Societe Entomologique de France* (5) 6: 389–400.
- BRAUER, F. & BERGENSTAMM, J. E. 1891. Die Zweiflügler des Kaiserlichen Museums zu Wien. V. Vorarbeiten zu einer Monographie der Muscaria Schizometopa (exclusive Anthomyidae). Pars II. *Denkschriften der Kaiserlichen Akademie der Wissenschaften. Wien* 58: 305–446.
- CROSSKEY, R. W. 1980. Family Tachinidae. In: Crosskey, R. W., ed., *Catalogue of the Diptera of the Afrotropical Region*. London: British Museum (Natural History). pp 822–882.
- 1984. Annotated keys to the genera of Tachinidae (Diptera) found in tropical and southern Africa. *Annals of the Natal Museum* 26(1): 189–337.
- CURRAN, C. H. 1928. Diptera of the American Museum Congo Expedition. Part II. Asilidae, Conopidae, Pyrgotidae, Micropezidae, Chloropidae, Drosophilidae, Lonchaeidae, Saproxyzidae, Muscidae, Calliphoridae, and Tachinidae. *Bull. Am. Mus. nat. Hist.* 57: 327–399.
- DE MEJERE, J. C. H. 1917. Studien über südasiatische Dipteren, XIII. Ueber einige merkwürdigen javanische Dipteren. *Tijdschrift voor Entomologie* 60: 238–251.
- GREATHEAD, D. J. & BIGGER, M. 1967. Notes on the biology of *Bogosia rubens* Villeneuve (Dipt., Tachinidae) a parasite of *Antestiopsis* spp. (Hem., Pentatomidae) and its introduction to Mt Kilimanjaro, Tanzania. *Tech. Bull. Commonw. Inst. biol. Control* 9: 1–8.
- GRIFFITHS, G. C. D. 1972. *The phylogenetic classification of Diptera Cyclorrhapha, with special reference to the structure of the male postabdomen*. The Hague: Junk. 340 pp. (Series entomologica: 8).
- KARSCH, F. A. 1887. Dipteren von Pungo-Andongo, gesammelt von Herrn Major Alexander von Homeyer. *Entomologische Nachrichten* 13: 4–10.
- MILLER, N. C. E. 1971. *The Biology of the Heteroptera*. 2nd (rev.) ed. Hampton: Classey. 206 pp.
- MITCHELL, W. C. & MAU, R. F. L. 1971. Response of the female southern green stink bug and its parasite, *Trichopoda pennipes*, to male stink bug pheromones. *J. econ. Ent.* 64: 856–859.
- RIKHTER, V. A. 1982. Some plesiomorphic characters of the male genitalia in the family Tachinidae (Diptera). *Entomol. Rev.* 59 (4): 162–171.
- RONDANI, C. 1873. Muscaria exotica Musei Civici Januensis. Fragmentum I. Species aliquae in Abyssinia (Regione Bogos) lectae a Doct. O. Beccari et March. O. Antinori, anno 1870–71. *Annali del Museo Civico di Storia Naturale 'Giacomo Doria'* 4: 282–300.
- TOWNSEND, C. H. T. 1916. Designations of muscoid genotypes, with new genera and species. *Insector Incitiae Menstruus* 4: 4–12.
- 1933. New genera and species of Old World oestromuscoid flies. *J. New York ent. Soc.* 40 (1932): 439–479.
- 1936. *Manual of Myiology*. Pt. 3. Oestroid classification and habits (Gymnosomatidae to Tachinidae). São Paulo: Charles Townsend & Filhos. 249 pp.
- VAN EMDEN, F. I. 1945. Keys to the Ethiopian Tachinidae. I. Phasiinae. *Proc. zool. Soc. Lond.* 114 (1944): 389–436.
- 1954. New or interesting Stomoxydinae, Phasiinae and Dexiinae of the Belgian Congo Museum (Diptera Calyptratae). *Annales du Musée Royal du Congo Belge. Sér 4to (Zool.)* 1: 548–552.
- VERBEKE, J. 1963. The structure of the male genitalia in Tachinidae (Diptera) and their taxonomic value. *Stuttgarter Beitrage zur Naturkunde* 114: 1–8.
- VILLENEUVE, J. 1913. Myodaires supérieurs de l'Afrique tropicale (1^{re} liste). *Revue de Zoologie Africaine* 3: 24–46.
- 1915. Myodaires supérieurs recueillis à Madagascar. *Revue de Zoologie Africaine* 4: 191–209.
- 1918. De quelques Myodaires d'Afrique. *Annales de la Societe Entomologique de France* 86 (1917): 503–508.
- 1923. Descriptions de Phasiinae nouveaux (Dipt.). *Revue de Zoologie Africaine* 11: 78–81.
- 1926. Myodaires supérieurs de l'Afrique nouveaux ou peu connus. *Revue de Zoologie Africaine* 14: 64–69.
- 1938. Myodaires africains (notes et espèces inédites). *Bulletin du Musée Royal d'Histoire Naturelle de Belgique* 14 (38): 1–16.
- WIEDEMANN, C. R. W. 1818. Neue Insecten vom Vorgebirge der guten Hoffnung. *Zoologisches Magazin. Kiel.* 1 (2): 40–48.
- 1824. *Analecta entomologica ex Museo Regio Havniensi*. Kiliae: Reg. typogr. Schol. 60 pp.
- 1830. *Aussereuropäische zweiflügelige Insecten als Fortsetzung des Meigenschen Werkes*. V.2. Hammerich: Schulz. 684 pp.

Date received: 22 November 1983.